DEFENSE INDUSTRY BULLETIN

March 1970

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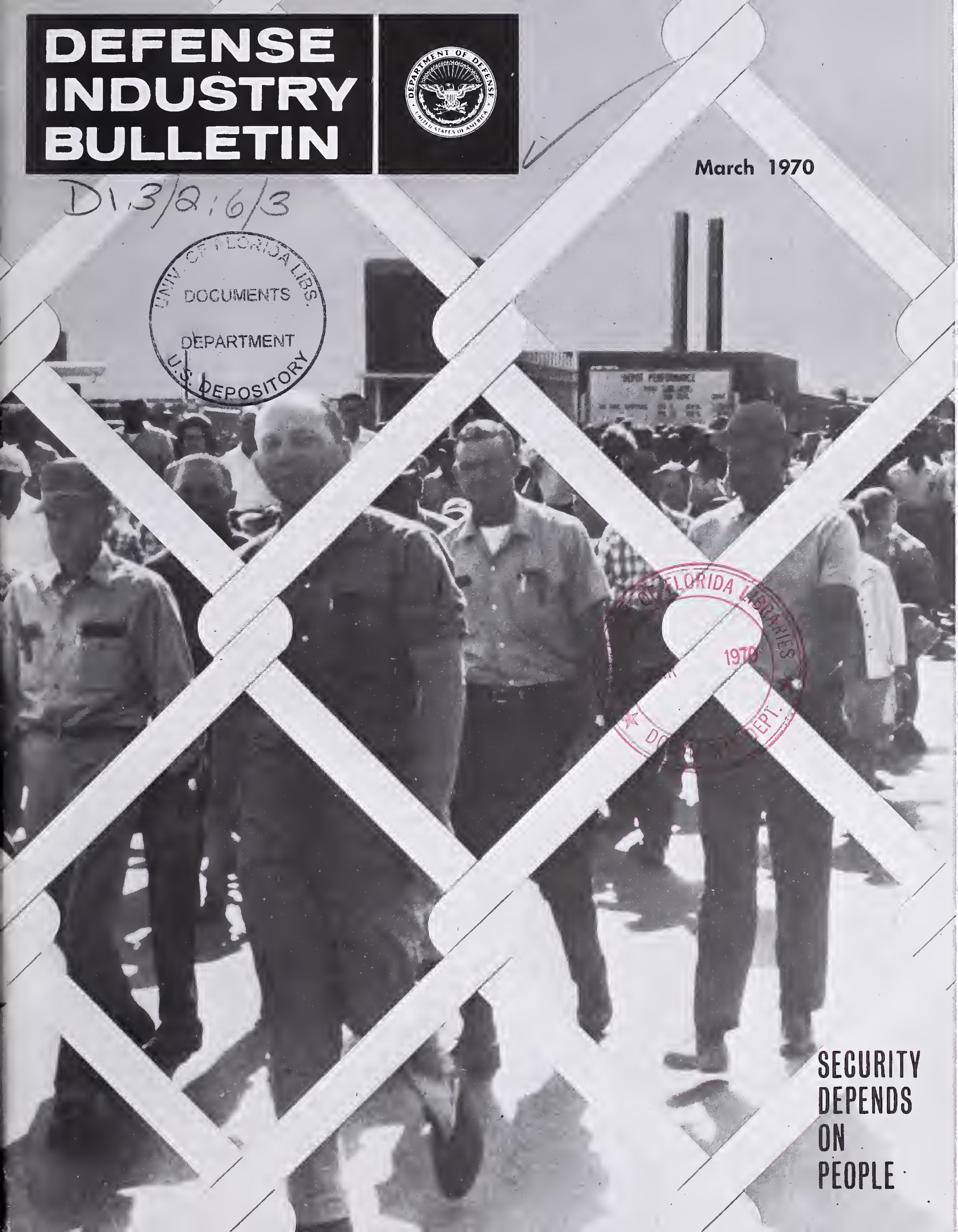

SECURITY
DEPENDS
ON
PEOPLE

DEFENSE
INDUSTRY
BULLETIN

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The *Bulletin* serves as a means of communication between the Department of Defense, its authorized agencies, defense contractors and other business interests. It provides guidance to industry concerning official DOD policies, programs and projects and seeks to stimulate thought on the part of the Defense-Industry team in solving problems allied to the defense effort.

Suggestions from industry representatives concerning possible topics for future issues are welcome and should be forwarded to the Editor at the address shown below.

The *Bulletin* is distributed free of charge to qualified representatives of industry and of the Departments of Defense, Army, Navy, and Air Force. Subscription requests should be submitted on company letterhead, must indicate the title of the requester, and be addressed to: Editor, Defense Industry Bulletin, Hq., Defense Supply Agency (DSAH-B), Alexandria, Va. 22314.

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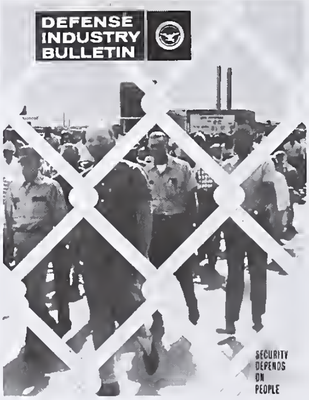

DOD security policy is designed to safeguard against adversity to the overall security of the United States. It affects millions of people. Industry shares with Government a responsibility to provide the required security. Security policy can be fully effective only if personnel involved are aware of their security responsibilities. A broad review of DOD security policy begins on page 1.

Dynamic Security Policy Serves National Interest

Joseph J. Liebling

It should prove useful and hopefully interesting, early in this new year and new decade, to review the security policy of the Defense Department, as it has developed and now exists. DOD security policy is designed mainly to safeguard against adversity to the overall security of the United States and its relationship to allied governments.

The fact that there is DOD security policy, that it affects millions of people, not only in the United States, but in other countries, and that sound security policy is vital to the security of our nation may be news to some readers. It is current and common knowledge to a relatively small group of people, directly involved in the day-to-day development and application of that policy.

This broad review of DOD security policy is intended for those individuals who only occasionally may come upon, or be directly affected by, some aspect of the policy. Managers, engineers, salesmen, scientists, and others in industry, who must function and produce in the face of what may seem to them to be irrelevant, restrictive and, sometimes, confusing security requirements, will benefit from additional information on this all-important subject. Knowledge begets confidence and enlightened responsiveness. Good, practical security can only be attained through enlightened understanding by each individual involved, because the national security places a responsibility on individuals and organizations, both in Government and in industry, to assure that the required safeguards are established and maintained. Under our system, where the national interest and requirements are melded and refined into proper security policy guidance, industry shares with Government a responsibility to provide the required security.

DOD security policy meets and interprets national considerations and requirements head-on, whether they are established in and by the Constitution, in public laws enacted by the Congress, or by Presidential executive order. New laws that are enacted, policy announcements or executive orders issued by the President, and court decisions are prime guidance sources for the development and implementation of DOD security policy. It is mandatory that DOD security policy legislation and planning include due and careful consideration of the expressed views and requirements of many segments of the Government, as well as all elements of DOD including the Military Departments, the Defense Agencies, and the field command operations.

Where policy is applicable to industry, careful consideration of the expressed views and suggestions of industry, through appropriately recognized industrial security professionals and their trade associations, must be

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Legal Bases of Security Policy

Congress, through authority vested in it by the Constitution, has enacted a number of laws which relate to the security policy and programs of the Defense Department. In response to and in conformance with these laws, security policy has been developed both internally to DOD, and externally in relation to other segments of the Executive and Legislative Branches of the Government, U.S. industry, international organizations, foreign governments, and the public. Statutory bases for the DOD security program include the Espionage and Sabotage Acts (Title 18, U.S. Code) ; the Internal Security Act of 1950, Public Law 733, 81st Congress; the National Security Act of 1947, as amended; and the "Housekeeping Statute" (5th U.S.C. 301).

The President, through authority vested in him by the Constitution, acting in his capacity as the Chief Executive and Commander-in-Chief of the Armed Forces, has issued executive orders, amended from time to time, which impose security responsibilities on the Secretaries of the Departments, and Heads of other Executive Branch Agencies. These include: Executive Order 10501, "Safeguarding Official Information in the Interests of the Defense of the United States;" Executive Order 10450, "Security Requirements for Civilian Employment;" Executive Order 10865, "Safeguarding Classified Information Within Industry;" and Executive Order 10421, "Providing for the Physical Security of Facilities Important to the National Defense."

assured. The national interest would be sparsely served if the national level policy sources, untreated in carefully developed security policy pronouncement, were left in their original and usually general terms to serve as guidance. We have, then, the national interest supported by DOD security policy, which is the umbrella covering eight broad security programs. These are discussed to some degree in this article. Several of these programs will be given more detailed treatment in later articles.

Before consideration may properly be given to these eight broad security program areas, an understanding of the relationship, one to the other, is necessary. These eight have been established because many subprograms within each are homogeneous, and to provide uniformity in their accomplishment. Each program is not sharply isolated, one from the other as an autonomous entity, but rather each is a part of the total security mosaic, mutually interdependent and supporting. The programs are:

- Personnel Security.
- Industrial.
- Investigative Management.
- International.
- Administrative and Physical Security.
- Security Support and Planning.
- Security Training.
- Classification Management.

Personnel Security Program

In any security system that is to be established, a basic consideration must be the trustworthiness of the people to be involved in its accomplishment. This precept is borne out by Presidential executive order which requires, for example, that persons, who are to be afforded access to classified information, must be determined to be trustworthy.

To fulfill this national requirement, and others involving personnel utilization and assignment, DOD directives establish subprograms covering military personnel, civilian applicants and employees, personnel security involving nuclear duties, and personnel security in special agencies.

Industrial Program

Industrial Security and Industrial Defense are subprograms in this broad security program area. The Defense Industrial Security Program (DISP) affects an appreciably large cross section of the nation. It involves those industries entering into contractual relationships with the Government in which classified information is involved in the performance of the contracts. There are approximately 13,500 cleared industrial facilities presently involved in the DISP, and these have approximately 2.2 million industrial employees cleared for access to classified information.

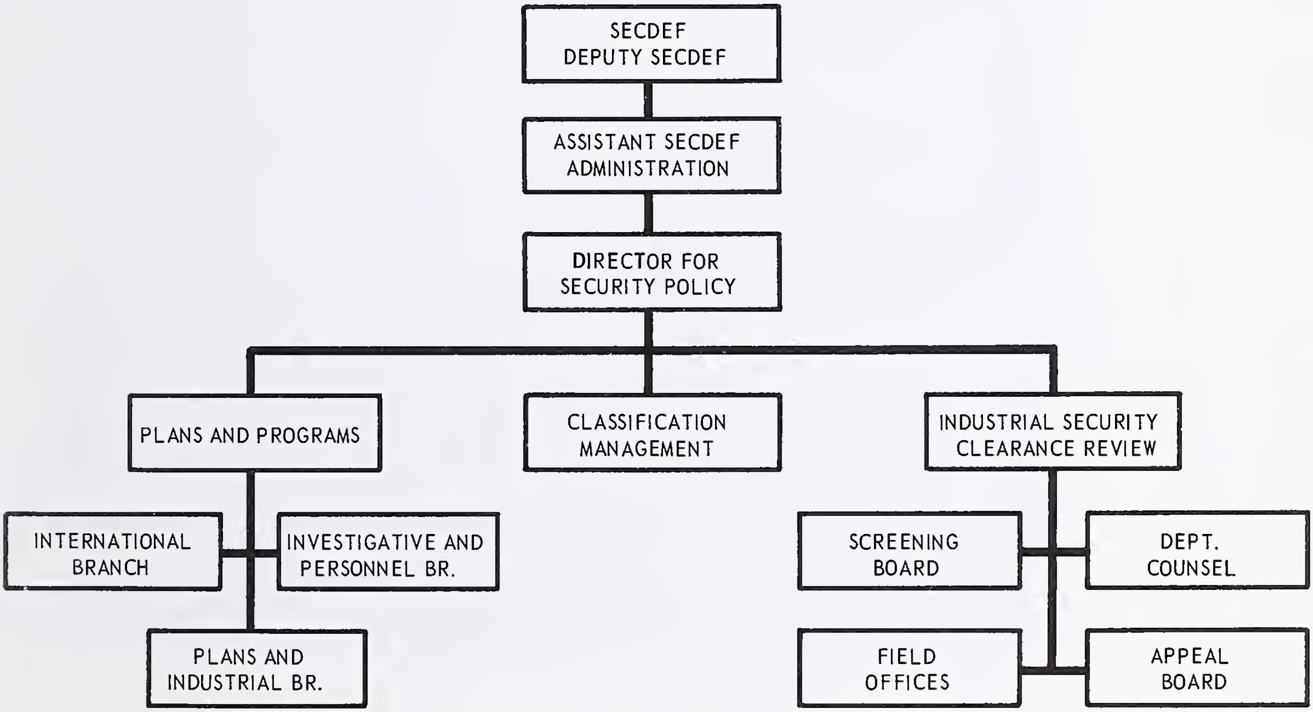
The Defense Department administers the DISP for components of DOD (Military Departments and Defense Agencies) and for 11 other agencies of the Executive Branch of the Government. Classified documentation alone runs into the tens of millions. Security clearances of industrial facilities and their employees are functionally included in the Industrial Security Program. Issuance of the vast majority of the industrial security clearances is handled at the Defense Industrial Security Clearance Office (DISCO), Columbus, Ohio. The final security clearance review and decision process is accomplished by the Industrial Security Clearance Review Division, Office of the Assistant Secretary of Defense (Administration), in those relatively few cases where issuance of a clearance by DISCO cannot be readily determined to be clearly in the national interest.

The Industrial Defense Program is a highly selective program involving about 3,500 industrial facilities, whose continued existence and viability are considered vital to the national defense from a direct military support aspect. Industrial defense policy follows the principle of "security in depth," meaning that physical security measures are used at the plant perimeter to prevent unauthorized persons access to the most critical and vulnerable areas therein. This principle is established mainly to reduce the probability of the successful accomplishment of the most damaging acts of sabotage.

Investigative Management

The Personnel Security Program directly depends upon information that is furnished by persons whose security eligibility must be determined, and upon information determined from other sources by the investigative elements of the Federal Government. Whatever the source, the information must be checked, verified and assembled. The security function accomplished under this program has a highly significant impact on the lives and careers of individuals throughout Government and industry. It is in the national interest, therefore, that

ORGANIZATION



investigative techniques, standards and criteria be clearly established and closely controlled. It is within this broad program area that the Background (Full Field) Investigation is established and defined, as is the National Agency Check.

The term "management" is included in this broad program title because of the sensitivity of investigations which affect the determination of the eligibility of personnel for access to classified information in the national interest. Management responsibility is clearly mandated, also, because substantial resources are used in accomplishing the objectives, and because these investigations and the utilization of the resulting information must be accomplished without infringement upon the basic rights of the individuals. These vital conditions must be met. There must be clear, balanced judgment of the national security and constitutional rights of people.

International Program

The Director for Security Policy of the Office of the Assistant Secretary of Defense (Administration) acts for the Secretary of Defense in his role as U.S. Security Authority to NATO, SEATO and CENTO; and for the Assistant Secretary of Defense (Administration) with respect to international organizations and individual countries in developing overall security policies; negotiating security agreements; and developing the U.S. security position, in collaboration with the Department of State, for expression to those organizations and countries.

Security agreements are drafted and negotiated with the defense agencies of foreign governments for the protection of classified information disclosed to those nations, and incidental to classified work undertaken by industry in either country. Special agreements, for the protection of classified information and material incidental to the sale of U.S. weapons and weapon systems, are also drafted and negotiated whenever they are needed. U.S. security policy standards and procedures are often adopted by the foreign countries. It is not unusual that each country agrees to protect the classified information of the other country to the degree that it protects its own information.

Administrative, Physical Security

This is an extensive program concerned with all physical safeguards and administrative procedures designed to protect defense information. Included in this program are special security requirements concerning re-

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stricted data and nuclear weapons, special security policy guidance for research and development, and the testing and evaluation of physical security equipment.

Security Support and Planning

National security policy is developed in many broad areas under this program. It encompasses several subprograms that are related both to daily operations and to planning for future policy requirements and operations.

A significant mechanism for action under this program is the Interdepartment Committee on Internal Security (ICIS), composed of representatives of the Departments of State, Treasury, Defense, and Justice, whose chairman is appointed by the President from the membership. Within this program area also is the emergency planning conducted in conjunction with the Office of Emergency Preparedness.

Security Training

Security policy, and the procedures to assure that security practices are in conformance with that policy, can be fully effective only if the personnel involved are aware of their security responsibilities, are aware of the reasons why certain procedures must be carried out and, further, are motivated to carry them out. The attainment of this all-important attitude is the objective of the Security Training Program.

The full meaning of this precept can be elusive, unless the reputation that certain aspects of security has regrettably carried through the years—the fear syndrome—is remembered. While it is true that security clearances are suspended and revoked for cause, especially in flagrant and in repetitive security violations cases, the policy is to attain the desired security condition through quality education and training.

Classification Management

The Security Classification Management Program is concerned with six classification aspects of information. They are:

- Levels of classification: Top Secret, Secret and Confidential.
- Authority to classify information.
- Principles applicable to classification.
- Declassification and change of classification.
- Marking of classified documents.

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In its broader context, this program precedes all of the others that have been discussed, because few other security actions would be needed if information did not require special handling and protection. Because it is in the vanguard of much of the security policy and requirements that we have today, lack of top-notch classification management at any level of Government or industry has far-reaching and undesirable effects. These effects detract from the desired security condition because of improper classification (or no classification); and because the effort and resources, in terms of costs, manpower and other administrative security measures expended to provide security, could be misdirected when information has not been properly identified and classified. It is most likely that this program will receive a heavier concentration of effort toward progressive declassification, consistent with security, then ever before. Total secrecy is incongruous with a democratic form of government. National security and the defense of the United States, however, does dictate the establishment of sensible rules and policies after intelligent evaluation of the threat and technological advancement worldwide.

DOD security policy can only be effectively applied through concentrated management and planning. In its more common use, the term "management" means the judicious use of available resources to meet designated objectives. For the purposes of this light summary discussion of this introduction to DOD security policy, the term "management" means assuring that policy is developed in an orderly fashion and, as published, is properly carried out.

A hasty conclusion would be: all that is required to assure conformance to policy is a rigid check and balance system. Not so. It is true, policy requires procedural conformance and that basic concepts and standards are met, but the rightness (sound legal and moral bases) of that policy is the prime mover for consistency in its application. Throughout the security programs, for example, due process of law is to be provided whenever the security clearance of an individual is to be denied or revoked for cause, while simultaneously protecting the national interest. This is the national policy, and it is DOD security policy.

To assure validity of security policy, the individual, again, is the key catalyst and administrator. As was previously mentioned, the development of policy is painstaking and meticulous. Many individuals, either directly or through organizational points of contact, are involved in the developmental stages. If their experience and local requirements and conditions are to be considered, the individuals must be provided the opportunity to be heard. In the case of industry, the Council of Defense and Space Industry Association, as well as individuals, actively participate in policy development efforts.

Because DOD security policy is national and international in scope, it must be dynamic, subject to change, alteration and adjustment and, at the same time, remain valid and effective. In recent years it has been more responsive than ever before to national security interests such as foreign policy, economic, military, labor, Congressional and the general public.

Throughout the security programs have been woven, through the establishment of policy guidance, a consistency that engenders instinctive and appropriate security action and judgment, if specific scripture and doctrine has not been produced. "Classification consistent with the importance of the information," the "need to know," "security in depth" are examples of policy concepts that have remained consistent through the years. Predictability, through sound policy, if properly expressed, is important to the total national security effort.

And finally, programs supporting security policy must be reasonable. A total security condition would stifle the nation if its defense effort could not be accomplished. Operations, manufacturing, progress, development and growth would be brought to a standstill, if security requirements were one sided and did not take into consideration the practical application thereof in Government and industry. Security must remain in its role, with sound management, initiatives and new incentives to assure that the attainable and proper condition is established and that national objectives are attained because it is appropriate and effective.

Radio Sets Tested for Digital Data Transmission Ability

Can today's military radios, many of which were developed for voice and teletypewriter transmission, handle the almost lightning speed of digital data transmission? To answer this question, the U.S. Army Electronic Proving Ground, Fort Huachuca, Ariz., has developed the Mobile Digital Data Transmission Test Facility. The purpose of the new facility is to evaluate operation of Army radio sets under high-speed digital data transmission loads.

The Mobile Digital Data Transmission Test Facility is designed around a computer. A prepared message is sent through the radio set under test and received by the computer which, then, matches the received message with an exact copy of the original. As it scans the incoming message and compares it with the original, the computer adds up the errors and computes the mean error rate. Thus, at the end of the test, engineers have a printout of the test results and can decide whether or not the radio set is capable of handling high-speed transmission.

Tests on present radio sets will determine which are suitable for high-speed transmission methods. Results may lead to the development of future radio sets capable of the precision required for digital data.

The new test facility is housed in two mobile shelters and can be moved to any site required. The computer and receiving equipment are in a trailer van, and the transmitting equipment is installed in a truck-mounted shelter.

Automation—Force Effectiveness Multiplier

Brigadier General Wilson R. Reed, USA

Data systems are like weapon systems, only more so.

A system is far more than a mere complex of intricate equipment: It is a combination of machines, methods and men, organized to accomplish a mission.

The Army, which incubated the Electronic Numerical Integrator and Calculator (ENIAC) during World War II and, thus, introduced electronic digital computer technology to the world, came to an early understanding of this dictum, and is applying its understanding vigorously.

In March 1969, the Chief of Staff of the Army established the U.S. Army Computer Systems Command (CSC) and assigned to the command a scope of responsibility and a range of automatic data processing (ADP) action areas, that are broader than any ever before assigned to a single line command in the defense establishment. The Computer Systems Command is responsible for centralized data systems development, integration, and support of all multi-command automatic data processing systems. Its charter establishes the CSC commanding general as project manager over ADP systems for combat, combat support, and combat service support in a tactical environment, as well as over the entire spectrum of administrative systems which are required both within the continental United States and overseas, but which can operate within a conventional fixed-station installation. The command is, therefore, the central systems design and management agency for systems calling for development of new vehicle-mounted, militarized data processing equipment, and for systems using the same commercial computer equipment used by industry, universities and Government for the full range of scientific, management and process control systems.

The command is located within the Army and is internally structured to play a central role in the development of all four system components (mission, men, machines, methods). The command is dedicated to the principle that men and mission are by far the most important system components.

Mission

System missions are defined by the top functional managers of the Army, by each of the Deputy and Assistant Chiefs of Staff, and by other agency heads of Headquarters, Department of the Army. To assure the proper interplay and collaboration between management need and technical response, the Computer Systems Command reports directly to the Army's Assistant Vice Chief of Staff, who

Brigadier General Wilson R. Reed, USA, is the first commander of the U.S. Army Computer Systems Command. He was formerly Commander, Automatic Data Field Systems Command. A graduate of the U.S. Military Academy, West Point, he also holds a Master of Arts in International Relations from Georgetown University, Washington, D.C.

maintains an Army Management Information Systems Master Plan. This plan establishes priorities within which all of the Department of the Army functional staff works to develop its management systems requirements. The Computer Systems Command works closely with these agencies to assure that these management requirements evolve into a system mission statement, which takes full advantage of the advancing technology and which is fully understood by the system designers.

The Computer Systems Command is a worldwide organization, but its headquarters is located at Fort Belvoir, Va. Fort Belvoir is not only close to the offices of the Army's top managers in the Pentagon, but is also the location of Headquarters, Army Combat Developments Command. Thus, for all tactical systems and, especially, for combat and combat support systems, mission definition is greatly enhanced by the intimate collaborations between the personnel of these two commands.

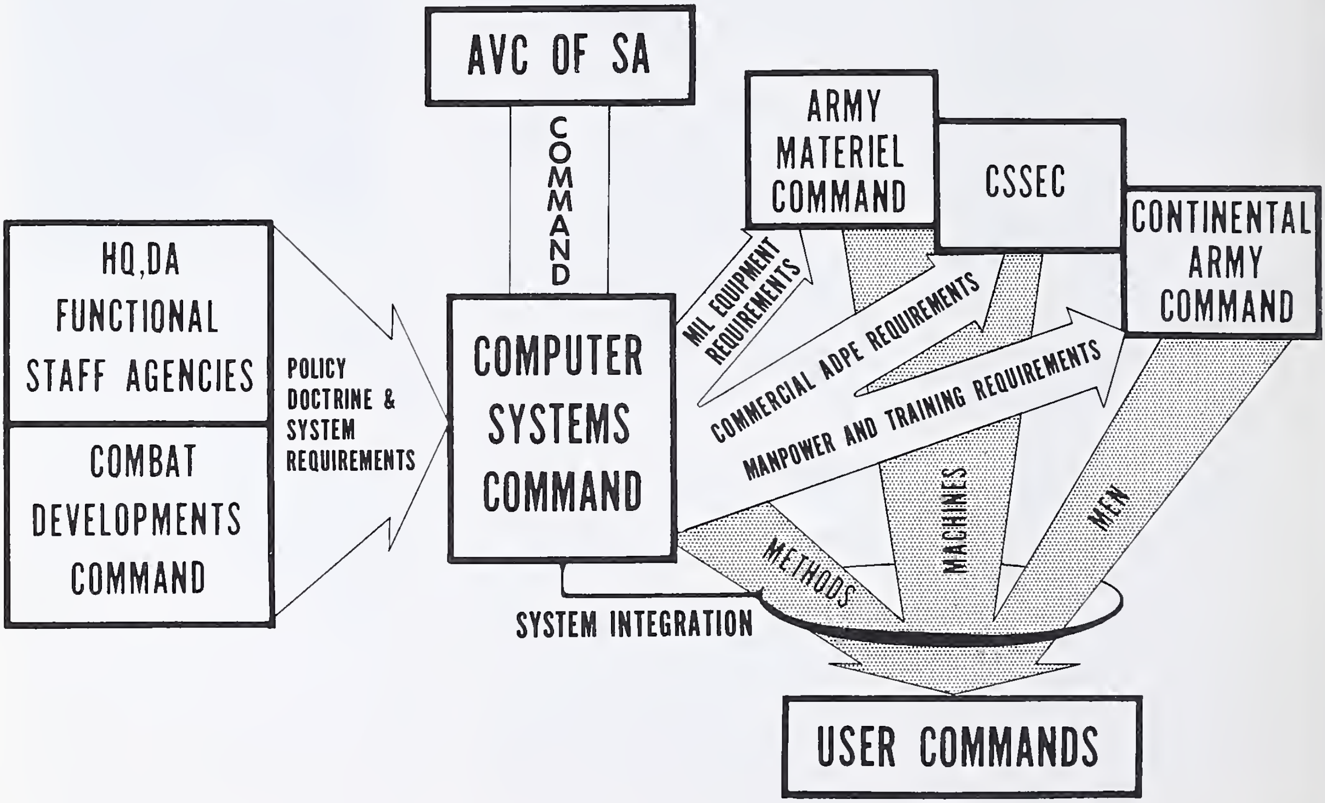
Machines

System design is based solidly on system mission definition, and the design phase is characterized by continuous dialog between designers, managers, and combat doctrine specialists. Hardware-software tradeoff analysis is performed when system design has progressed to the point that machine requirements and computer programming requirements can be specified separately. Acquisition of machines is accomplished with the participation of two other Army agencies.

Materiel development is the responsibility of the Army Materiel Command, whose headquarters is also within a short drive of Fort Belvoir. Whenever new ADP equipment development is necessary, either to meet militarization requirements or to advance the state of the art beyond the off-the-shelf stage, the Army Materiel Command performs the equipment acquisition. When commercial equipment is required, the Army Computer Systems Support and Evaluation Command at nearby Fort Myer, Va., makes the equipment selection. Both of these commands work in response to equipment specifications set by the Computer Systems Command, and all procurement is executed through Army Materiel Command procurement offices.

Methods

The methods component of each data system combines the manual methods for system operators and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COMBAT DEVELOPMENTS COMMAND
POLICY DOCTRINE & SYSTEM REQUIREMENTS
COMPUTER SYSTEMS COMMAND
ARMY MATERIEL COMMAND
CSSEC
CONTINENTAL ARMY COMMAND
MIL EQUIPMENT REQUIREMENTS
COMMERCIAL ADPE REQUIREMENTS
MANPOWER AND TRAINING REQUIREMENTS
METHODS
MACHINES
MEN
SYSTEM INTEGRATION
USER COMMANDS

users, and the automated methods which are programmed into the computers. Once again, constant teamwork is performed to maintain full synchronization between user and management procedures, developed by the management agencies; and computer programs, data control, and operations procedures, developed by the Computer Systems Command. Often, the assistance of software contractors is engaged through the Army Materiel Command procurement offices.

Men

As the systems design progresses, incorporating equipment development, computer programming, and standard operating procedures preparation, project personnel of the Computer Systems Command work closely with the Army Materiel Command, the Combat Developments Command, and the Continental Army Command to perform the necessary methods and skills analysis, and to determine the numbers and qualifications of personnel required to operate and use the systems.

Training of both user and operator personnel is performed by the Continental Army Command. To assist in the training process, the Computer Systems Command, working with the Combat Developments Command, provides:

- Essential inputs to the establishment of tables of organization and equipment.
- Systems documentation to serve as basis for training manuals and user and operator reference material.
- Instructor training.
- Assurance that plans of instructions are up to date with current versions of system design.

Tying the System Together

System integration is performed by the Computer Systems Command. Trained men and delivered equipment are brought together with the computer programs and all appropriate documentation by the command's field operations specialists. Command personnel supervise the knitting together of these elements into an operational system, and deliver the system to the ultimate customer, the field commander. Command personnel help the field commander to convert from his earlier procedures to the new system. A worldwide network of support groups and field assistance teams continue to provide field engineering support for the entire useful life of the system, calling upon CSC headquarters design personnel who hold their toothbrushes at the ready-to-go-anywhere-in-the-world posture if a sufficiently serious design problem calls for it.

Operation of the delivered system is turned over entirely to the field commander. It is his system, and its men and machines belong to him. Methods are updated by the Computer Systems Command when design improvements are required, or when top Army management modifies the mission statement for the system.

CSC Organization

Though the Computer Systems Command derives much benefit from its relationships with the many other agencies, both within and outside the Army, the projected growth of the command will provide self-sufficiency in all aspects of data systems technology.

Special emphasis is placed upon the CSC Scientific and Management Advisory Committee, a specialized version of the Army Scientific Advisory Panel, devoted to all aspects of research and development in computer technology and information science. Convened and coordinated by the CSC Chief Scientist, within the Office of the Commanding General, the committee has a membership of data systems authorities of national reputation. The committee includes scientists from industry, Government, and academic institutions whose specialties range from systems architecture to equipment production, and the management of data and information systems.

The CSC mission is divided between two major organizational units, headed by a Deputy for Systems Management and a Deputy for Technical Management.

Deputy for Systems Management

Operating under a project manager's charter, issued by the Secretary of the Army, the Computer Systems Command implements the principles of project management with an organizational structure which designates a system director or system manager for each data system assigned to the command. Each systems management office serves as the coordinating agency for the execution of all actions in the life-cycle management of a system and, as such, works as a central clearing house on all systems developed and released by the command for field use.

System management offices are located within the Project Control and Integration Directorate, and are organized into divisions according to echelon levels serviced. The Organization Systems Division contains systems management offices for all data systems designed primarily to serve lowest echelon organizational units. Similarly, the Base Systems Division and the Army Support Command Systems Division contain systems management offices for all data systems to be implemented at respectively higher echelons.

The various system management offices represent the primary authority within the command for assigned systems. For other than emergency programming support, they are the offices at CSC headquarters through which field units, support groups, and higher headquarters staff agencies interface with the command. They obtain the necessary resources from Headquarters, Department of the Army; surface problems and speed up the decisions necessary for their solution; and, above all, expedite the delivery of support to the user in the field.

Data systems development directorates perform actual system development, maintenance support, and emergency programming support. Each directorate is keyed to one technical specialty of the Army and contains a staff of system designers, system analysts, and computer programmers.

The Logistics Data Systems Directorate specializes in logistic systems, including supply systems, transportation systems, and materiel readiness systems. It also represents a concentrated source of advice and assistance in these areas.

The Personnel and Force Accounting Data Systems Directorate is devoted to all matters dealing with manpower. Examples include personnel record keeping, force accounting, and medical regulating.

The Financial Data Systems Directorate concentrates on systems which serve the comptroller function throughout the Army.

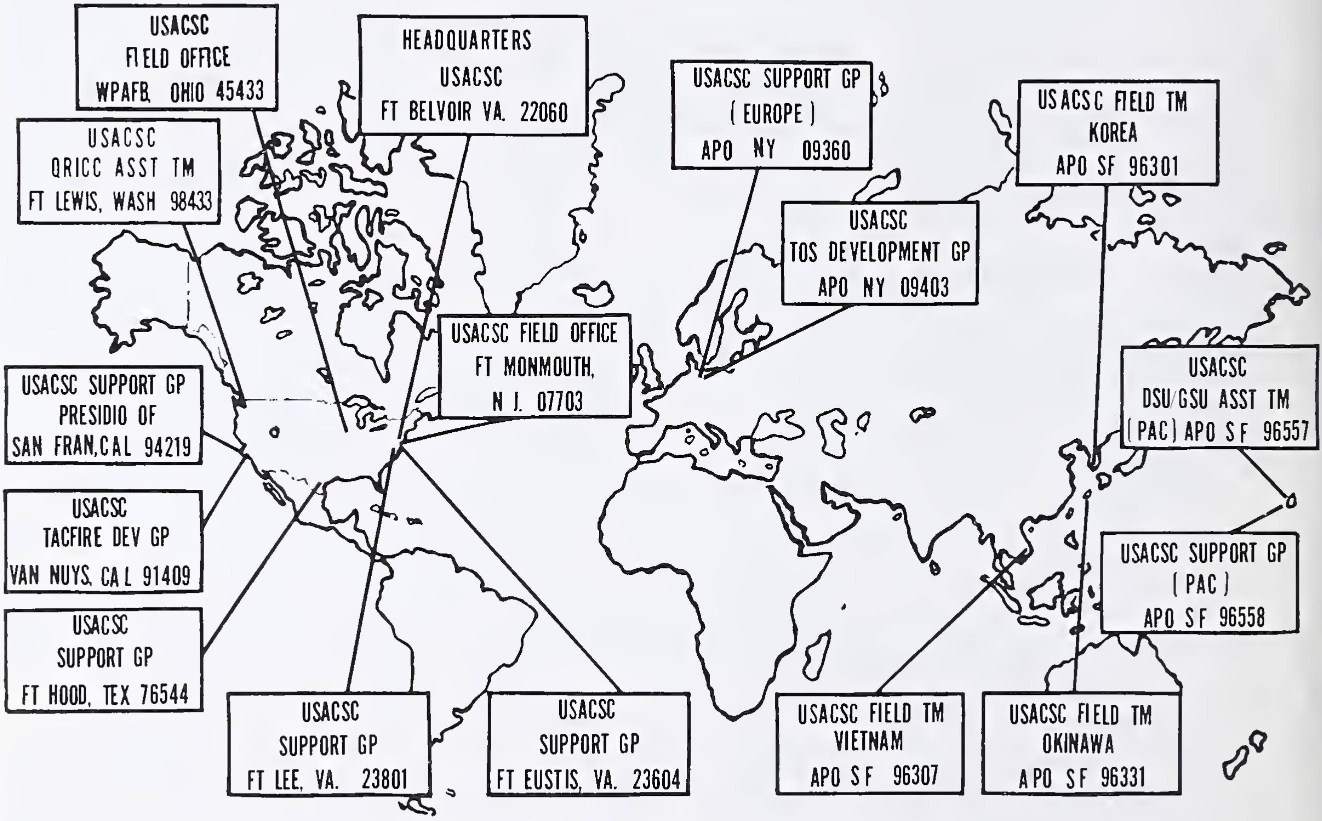
These directorates actually design and develop the data systems released to field and to fixed-station installations. They are responsible for producing a fully tested and documented operational package, and for its support once it goes into operation. Rigid adherence to test standards and procedures minimize the need for on-site emergency fixes. Each directorate maintains a full-time standby service for furnishing emergency fixes and advice to the user.

From the very start of the system life cycle, each of these directorates is the primary contact with its counterpart Department of the Army staff element responsible for defining system requirements. The directorates provide "hands-on" experience in functionally specialized ADP design. Thus, their personnel are functional specialists, as well as ADP specialists.

At CSC headquarters, the Field Operations Directorate is engaged in certifying the operability of all systems and modifications developed by the command, and in delivering them to the field. Field operations personnel coordinate and perform site surveys, advise on-site preparation, arrange for equipment delivery, and monitor acceptance tests of ADP equipment. They assist in the installation of the equipment, and assure that the hardware is ready to accept the systems workload.

Because field operations personnel also perform system testing and certification, they are expert in systems capability and operations requirements. They are experienced in data conversion planning and cutover of operations from old system to new. Field operations personnel have a working knowledge of data processing operations management—scheduling, machine room procedures, data control and utilization reporting. They serve as a central clearing house for manufacturers' support to commercial ADP equipment. They interface with the Continental Army Command to assure proper training support. Field operations personnel are proficient and ready to assist on all problems related

UNITED STATES ARMY
COMPUTER SYSTEMS COMMAND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USACSC DSU/GSU ASST TM (PAC) APO S F 96557
USACSC TACFIRE DEV GP VAN NUYS, CAL 91409
USACSC SUPPORT GP (PAC) APO S F 96558
USACSC SUPPORT GP FT HOOD, TEX 76544
USACSC SUPPORT GP FT LEE, VA. 23801
USACSC SUPPORT GP FT EUSTIS, VA. 23604
USACSC FIELD TM VIETNAM APO S F 96307
USACSC FIELD TM OKINAWA APO S F 96331

to ADP preparation and installation, and the establishment of smooth operation, whether or not the system is one the Computer Systems Command has delivered.

On the current Tactical Operations System (TOS) and the Tactical Fire Direction System (TACFIRE), systems, management and field operations are supported as on other projects, but from totally project-oriented directorates devoted to TOS and TACFIRE, and similar systems as assigned. Thus the command maintains in-depth capability, even when the problem involves Army-developed hardware and in-house Army executive software support capability.

Deputy for Technical Management

Through the staff of its Quality Assurance Directorate, the command imposes rigorous standards of quality assurance on its in-process activity. This group of ADP generalists also serves as a staff of in-house consultants to evaluate data systems design and progress, to identify incipient problems, and to make timely recommendations for their solution.

Development and modification of general purpose executive software is a growing function associated with ADP systems. General purpose software is at times inefficient and unnecessarily time consuming, when applied to a limited range of applications. Tailoring can result in significant improvements in efficiency. Particular skill is required, however, to adapt machine-oriented programs. Therefore, the Computer Systems Command has established a Design Support Directorate of software specialists who are devoted to software research and development activity, developing new techniques, and modifying manufacturers' software.

An Engineering Support Directorate, with a staff of data system-oriented electronic engineers and communications specialists, assures proper communications planning in support of multi-command ADP systems. Electronic engineers, specializing in computer equipment design, are included in this staff. This planning resource is available to all Army users of ADP systems.

Current Projects

Several major systems assigned to the Army Computer Systems Command are intended for battlefield deployment.

The Tactical Fire Direction System (TACFIRE) is an integrated truck-mounted, on-line tactical computer system being developed for the Army's field artillery units. TACFIRE is being built to increase the effectiveness of field artillery support through increased accuracy, better and more rapid use of target information, reduced reaction time, and greater efficiency in the determination of fire capabilities and the allocation of fire units to target. Specifically, TACFIRE applies automatic data processing to perform technical fire control, tactical fire control, fire planning, artillery target intelligence, artillery survey, meteorological data, and ammunition and fire unit status. One of the goals of the present program is to provide the materiel base for a family of militarized general purpose ADP equipment suitable for use by other Army tactical ADP systems.

The Tactical Operations System (TOS) is a truck-mounted combat system, an on-line automated information system incorporating remote inquiry and time sharing features. TOS is being developed to use high-speed computer facilities located at communications centers near division, corps and Army main headquarters to serve the commander, planning staff, and tactical operations centers. The objective of TOS is to increase significantly the effectiveness of tactical operations within the Army in the field in three areas: operations (including personnel and logistics summary information pertinent to the operations estimate); intelligence; and fire support coordination. The introduction of a first-generation ADP system is projected for the mid-1970 time frame, and most TOS equipment will be identical to TACFIRE materiel.

Combat Service Support System (CS3), a van-mounted automated administrative support system for use at several echelons of the Army in the field, provides through integrated automation a computer-supported logistics, personnel and administrative system to increase the responsiveness of combat service support required by the Army in the field.

Quick Reaction Inventory Control Center (QRICC) is a special combat service support which uses equipment and logistics programs of the CS3 System. The QRICC is a deployable inventory control center, using CS3 logic, which can be used in expediting the provisioning of any special task force.

Theater Army Support Command System (TASCOM) requirements are now being defined for combat service support. These requirements will be implemented by the Computer Systems Command.

Division Logistics System (DLOGS) is a van-mounted combat service support system which automates repair parts provisioning, property book reporting, and equipment status reporting. Now operational, the DLOGS system will be phased out as the more powerful CS3 system becomes ready to replace it.

The Direct Support Unit/General Support Unit Computer System (DSU/GSU) is also fully operational. It is a magnetic ledger card system used for automation of stock record accounting of repair parts (previously accomplished annually by the use of visible record files) in direct and general support units. A small-scale, low-cost computer system, using commercial off-the-shelf ADP equipment mounted in two M373 semi-trailer vans, the system is self-sufficient and operates from a 30KW trailer-mounted generator shipped with each system. Over 105 DSU/GSU systems have already been delivered to the Army in the field in Vietnam, Thailand, Okinawa, Germany and the continental United States; and 43 additional systems will be delivered by June 1970. Even after deployment of CS3, the DSU/GSU system will continue to operate as the organization level ADP system for the Army in the field, exchanging data with CS3 to assure optimum support from rear echelons.

The Personnel Management and Accounting-Card Processor System (PERMACAPS) automates various military personnel applications for the Army in the field. PERMACAPS uses card processor and peripheral equipment mounted in four transportable expansible vans. PERMACAPS combines Army division and personnel services company personnel data processing systems and the Army-wide personnel reporting system, to enhance data processing capabilities and improve internal division personnel management support. There are 37 PERMACAPS installations worldwide, with 17 additional installations planned by the end of 1970. Like DLOGS, PERMACAPS will be phased out as CS3 is deployed worldwide.

To back up battlefield automation, several other data systems, operating fixed-station installations, complete the roster of systems assigned to the Computer Systems Command:

CONARC Class One Automated System (COCOAS) is a base-level management information system designed to meet many management and reporting requirements at installation level, and to serve commanding officers of Class 1 posts, camps and stations throughout the continental United States. The prototype equipment configuration, operational at Fort Sill, Okla., uses third-generation commercial computer equipment. The fundamental objective of COCOAS is to improve the readiness of Army units by being responsive to the informational requirements of all unit commanders, and by providing timely and accurate administrative and supply support to obtain maximum effectiveness from available resources.

Centralization of Supply Management and Operations System (COSMOS) is an automated retail supply system which performs supply management and stock fund management for each continental U.S. Army. The primary equipment configuration consists of a third-generation, disk-oriented central processor with a satellite computer for communications switching.

The Standard Supply System (3S) became the responsibility of Computer Systems Command in the Pacific Theater. It is a theater-wide depot/inventory control center supply and stock fund data processing system, designed by the U.S. Army, Pacific, and responsive to the various missions of the major subordinate commands in the Pacific Theater. The 3S system processes supply and related financial transactions for subordinate command supply depots and finance and accounting offices, to satisfy depot customer's materiel demands quickly and economically through maximum use of electronic computer capabilities.

The Continental Army and Major Overseas Command System (CARMOCS) is used among other functions to maintain personnel master files of all military personnel assigned to the geographical areas of eight data processing centers, one serving each of the five continental U.S. Armies; U.S. Army, Pacific; U.S. Army, Vietnam; and U.S. Army, Europe. An equipment upgrading program is now underway. CARMOCS assures accuracy in the maintenance of active Army personnel data banks and timely processing and transmission of data. Among the benefits are management control based

UNITED STATES ARMY COMPUTER SYSTEMS COMMAND

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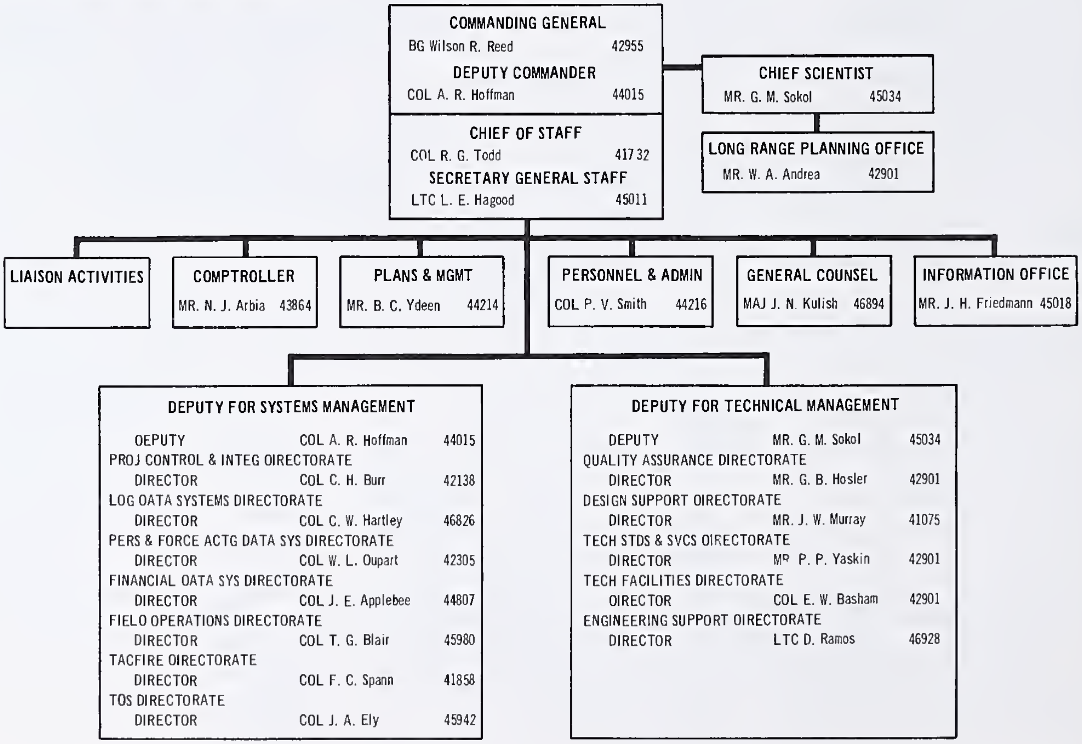
COMMANDING GENERAL
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MR. G. M. Sokol 45034
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on planning, standard system and strict reassignment controls, reduction of workloads, and system-wide compatibility.

Looking to the Future

Projects earmarked for assignment to the Computer Systems Command in 1970 and following years include:

The USAREUR Supply and Maintenance System was developed by the Materiel Command of Theater Army Support Command, U.S. Army, Europe (USAEUR), to provide centralized theater control of supply management, stock control, field depot maintenance, and supporting finance and transportation functions. The system is operational at the single USAEUR Inventory Control Center. Maintenance of the system will be assumed by the Computer Systems Command early in calendar year 1970.

The Army Authorization Document System (TAADS) is a guidance and reporting system in the definition stage. CSC personnel are participating members of the TAADS team of Headquarters, Department of the Army, to initiate the life cycle. A General Functional System Requirement is currently being developed. The Computer Systems Command is anticipating the assignment of TAADS as an additional operating information system within several of the established projects.

Integrated Facilities System (IFS) is a guidance and reporting system in the development stage within Headquarters, Department of the Army. CSC liaison with the proponent, Deputy Chief of Staff for Logistics, is being accomplished in the development of Functional Systems Requirements.

Military Police Operating Information System (MPOIS) is a system for the support of military police functions in the definition stage. CSC liaison has been established.

Communications-Electronics Management Information System (CSMIS) is a system to support the Assistant Chief of Staff for Communication-Electronics. The initial application is "Automated Frequency and Call Sign Assignment Procedure for the Army in the Field." CSC personnel are working closely with Headquarters, Department of the Army, in planning for the installation of the contractor-developed system.

Greater Force Effectiveness

The Army Computer Systems Command is a single agency whose functions cover life-cycle project management, systems development, and systems support for all Army multi-command data systems. Substantial manpower growth of the command is projected for the next five years, but centralizing control over system development and support will lead to better application of resources, and far more data processing capability with, if anything, a net reduction in requirements for scarce design and support talent.

Automation does not add to the nation's defense arsenal; it multiplies its effectiveness. The systems being developed and delivered by the Computer Systems Command to the Army in the field and at home do not do the soldier's thinking for him. They incorporate data shaping machine tools, relieving the soldier of the drudgery of rethinking tactical and administrative processes which have already been thoroughly defined by experienced doctrine developers and top managers. As such, they multiply the effectiveness of the weapons available to the Army today.

The Computer Systems Command is dedicated to this force effectiveness multiplication in an era when additives are not likely to be sufficient.

DCA Sets Up DECCO-Europe Office

The Defense Communications Agency (DCA) has established a Defense Commercial Communications Office (DECCO) in Europe.

DECCO-Europe, at Sembach Air Base, Germany, joins DECCO-Pacific, in Hawaii.

DECCO's mission is to procure, account and pay for leased communications facilities, services and equipment for the Defense Department and other government agencies, as designated by the Secretary of Defense.

USAF To Get Portable Instrument Landing System

The Air Force has completed testing and evaluation of a new lightweight portable instrument landing system for use at combat airfields. A contract was awarded to the Kearfott Division, Singer-General Precision, Inc., Pleasantville, N.Y.

Designated the AN/TRN–27, the equipment is commercially known as TALAR IV (for tactical approach and landing aid). First units are expected to be in use in the field in about one year.

The TRN–27 is a microwave electronic system consisting of two units: a ground transmitter and an airborne receiver. The transmitter, weighing only 57 pounds, can be set up and aligned by one man. It can operate from three different power sources: 24 volt DC (battery); 28 volt DC (portable generator); or 115 volt 60 cycle AC (standard house current).

The solid state receiver consists of a radio frequency head, with antenna, and course interpreting circuits, and operates on 28 volt DC aircraft power.

Maximum range of the AN/TRN–27 is about 30 miles. Minimum usable range under conditions of a ½-inch-per-hour rainfall is about 11½ miles.

New MUST Components Tested by Army

Testing of additional components for MUST (*M*edical *U*nit, *S*elf-contained, *T*ransportable) hospitals has resulted from successful service of these units in Vietnam since 1966. The Army Surgeon General has called for eventual conversion of all Army field hospitals to these revolutionary units.

To expand their utility, the Army Materiel Command has undertaken testing of a water and waste management system for MUST. Testing is also planned on a MUST food service system, including a dining room for staff and ambulatory patients. Other equipment developed for MUST units includes pharmacy, X-ray and dental facilities, sterile preparation rooms, and a clinical laboratory.

FROM THE SPEAKERS ROSTRUM

The Battlefield of the Future

Address by Lt. Gen. George I. Forsythe, USA, Commanding General, U.S. Army Combat Developments Command, Ft. Belvoir, Va., at DOD-National Security Industrial Assn. Symposium on Sensor Aided Combat Systems, Gaithersburg, Md., Jan. 8, 1970.

Lieutenant General George I. Forsythe, USA, is Commander, U.S. Army Combat Developments Command. Previously, he commanded the Army's Infantry Center and Infantry Shool, Fort Benning, Ga. He has been Commander of the 1st Cavalry Division (Airmobile) in Vietnam. He is a graduate of the University of Montana and the Air War College.

In a recent address Army Chief of Staff General William C. Westmoreland spoke of a "quiet revolution" in ground warfare. This revolution has some of its roots in Vietnam, but others are found in the variety of materiel and conceptual developments associated with the Army's continuing search for greater effectiveness. These developments are quietly changing the shape and substance of land combat operations and forces. New capabilities are bringing us progressively closer to a battlefield concept involving the employment of highly integrated combat systems heretofore undeveloped. The objective of all this, of course, is success in battle with minimum loss of human life—our nation's most precious asset.

This goal derives from the very essence of our national character. Unlike certain other world powers, we, as a nation, have always placed a high premium on the inherent value of human life. Our political and industrial development has constantly searched for ways to relieve men from danger, drudgery and demeaning toil; these value scales on human endeavor are also translated to the battlefield.

To state it simply, the Army must take full advantage of our exploding technology to improve our effectiveness in supporting national aims, while at the same time reducing our manpower requirements and the exposure of our men to the dangers of the battlefield. Stated another way, we now have greater opportunities to replace men with machines while, at the same time, bringing into being a U.S. Army operational capability superior to that of any possible opponent.

With the course thus defined, it is, then, very clear that we will continue to depend on the teamwork of the industrial, scientific, academic and military communities.

Development Program

The Army's developmental program considers concepts and requirements within the framework of the five functional areas of land combat. We delineate them as: intelligence, mobility, firepower, command and control, and logistics support.

For the purpose of the discussion to follow, I prefer to simplify these five functions into three. I guess this is because I had some very good training by my platoon sergeant when I was a very junior second lieutenant almost 30 years ago. Sergeant Donkowsky, then a veteran soldier, explained that the basic job we had to do was "find 'em, fix 'em and fight 'em, feeding all the while." He gave me that advice during a time when our ability to "find 'em" was pretty much limited to observation posts and listening posts, limited to a man's eyes aided by a pair of binoculars, and to his ears occasionally aided by a hearing horn! We had little in the way of aids to extend man's basic physical senses.

Then, our ability to maneuver on the battlefield to *fix* the enemy was limited pretty much to the "Munson Last" Army field shoe, a 2½-mile-per-hour means of transportation. At best, our tanks and trucks could move about the battlefield at something like 5 miles per hour.

Our ability to "fight 'em" was based on a family of weapons that had evolved from World War I: the old heavy water-cooled machine gun, the stokes mortar, the U.S. version of the "French 75" field piece, and the British "one pounder." Our logistics support—"feed 'em" systems—were equally primitive.

World War II and Korea saw advances in hardware, but relatively recent developments are having a major impact on the land combat system of our country. Because we have already adopted the major advances that have been made in our ability to "fight 'em," I want to enumerate a few of those first.

To "Fix and Fight 'Em"

Transistors and small power sources have had a major impact on munitions technology. Combine these developments with advances in computer technology, and we have small anti-tank and air defense missiles giving us high hit-kill probabilities at longer ranges than were ever attainable in the past. Progress in weaponry continues as laser technology, developments in lighter-weight metals, and computer science applications are exploited.

Our ability to maneuver to fix and to fight the enemy has also been greatly improved by the helicopter. On the battlefield, living and fighting with the soldier, the helicopter has provided a revolutionary advance in mobility and responsive firepower. No longer are we constrained by terrain obstacles that require a back-breaking effort to surmount. The agility, speed and flexibility of the helicopter, coupled with fire suppression techniques, have established the role of the helicopter on the battlefield as a "fighter *and* feeder." Further advances sought in helicopter technology are in the areas of all-weather capability, improved weapons-delivery capabilities and improved speed and lift capabilities.

Together, improvements in firepower and mobility give us a greatly increased capability to fix the enemy as well as to fight him, once fixed. However, the key to exploiting this increased capability is our ability to find the enemy, for if we can find him quickly and accurately, then we stand a good chance of fixing and defeating him.

To "Find 'Em"

This is the aspect of land combat that requires the greatest effort now—the "find 'em" problem! American technology is about to provide us with the means by which combat areas can be under 24-hour real time, or near real time, surveillance of many sorts. Once this is achieved, virtually instantaneous communications, combined with applications of increasingly effective firepower, will permit the selective engagement of any target identified on the battlefield.

Some progress is being made to close the intelligence gap. Each year witnesses substantial improvement. In Vietnam, we learned, and quickly, to adapt and refine combat and intelligence units to be responsive to the unique requirements of fighting that enemy; we found ourselves more and more using the infantry to *find* as well as *fight* the enemy; and we organized special reconnaissance elements of all kinds, including long-range patrol companies and special forces teams. We learned to break down into small units when the enemy did, and to operate with growing skill at night. Intelligence organizations necessarily saw considerable expansion and refinement. Sensors of all kinds were introduced to great advantage. But we were just scratching the surface in this field and other technical fields to support surveillance operations—electronics interceptors, side-looking radars, sensory devices like the "People Sniffer," the Starlight Scope, and improved front line surveillance radar.

Within the past year, additional steps have been taken to coordinate and accelerate the entire Army-wide Surveillance, Target Acquisition and Night Operation (STANO) effort. STANO development is further enhanced by the recent creation of a test facility at Fort Hood, Tex.—Project MASSTER—to carry out the actual experimentations, evaluation and integration of new STANO doctrine, equipment and organizations. Combat Developments Command (CDC) is another important part of this carefully designed management program; for, drawing from past experience, expanded capabilities in the field depend on far more than just the development of new equipment. Concepts of doctrine, organization and training must be formulated in time to meet new hardware as it rolls off the production line.

Land Combat System Design

CDC is responsible for preparing a conceptual design for a land combat system of the future. While this design is not yet fully developed, I will give you one example of a design approach to assist the commander in the field in carrying out the functions of combat, and to provide maximum improvement in the application of the principles of war.

Our conceptual design must be based on three elements: the future threat, as we see it; present operational trends based on experience; and materiel development, both present and projected. As background to my description of present Army thinking on the land combat system of the future, I want to say a few words about the threat and present trends—I have already remarked on advances in the materiel area.

Threat Assessment

In describing the threat as we see it, I must first caution you not to misinterpret my remarks as predictive—the efforts of CDC must be based on *potential* enemy capabilities and all possible involvements of our nation in ground combat.

In assessing the threat which the U.S. Army may face in the future, we consider not only the current military capabilities of potential enemies, but equally, if not more important, we must try to visualize the significant advances they are likely to make. We know of the Soviet's keen interest in achieving a world leadership position in technology, and we can expect their technological achievements to be reflected in their future military forces. We know that Communist China is far from idle in regard to its military posture. Whether or not direct ground combat confrontation between the United States and either of these major powers occurs, any other enemy the United States may face will most assuredly be supported by one or both.

The U.S. Army must be designed, equipped and trained with an inherent flexibility to meet the full spectrum of any enemy ground threat from an insurgency in an under-developed country to a nuclear-supported ground assault across Western Europe.

Trends for Future Development

To a degree, some aspects of the battlefield of the future are being demonstrated in combat in Vietnam. I want to draw your attention to two—of many—trends that impact on the land combat system. These trends constitute another basis for future development.

First, we see an increasingly discernible trend toward what I will call the "porous battlefield." This has been brought about by a continuing decrease in the population density of combat areas. Obviously, this trend is not entirely new with the 1960s. Even the briefest look at the history of warfare will show that the density of the battlefield, in terms of people per square mile, has seen a relatively constant lessening as a result of improvements in weapon capabilities and ranges, and the restructuring of battle tactics and organizations following technological breakthroughs. But in terms of actually expanding the tactical area that can be positively dominated, controlled and engaged by a decreasing number of individual human beings, the tactical commander must have a greater capability of knowing accurately what is going on in that area on a real-time basis. The day of the binoculars, the listening post, and the mounted messenger is long past.

The second important trend, closely allied to the notion of a porous battlefield, is an increased "stand-off" factor in every aspect or function of combat operations, ranging from actual fire delivery, through support services for combat units, to the very means employed to gather or transmit information and intelligence to the tactical commander for decision-making purposes. Stand-off means simply that hand-to-hand, or "eyeball to eyeball," combat will become increasingly rare. Battlefield opponents literally stand off from each other, horizontally and vertically, and thus are frequently invisible to each other. The side that can best employ technological means to find and engage the other has the marked advantage.

The trends of the porous battlefield and increased stand-off lead to a visualization of how combat will be conducted in the future. Increasingly mobile units will be employed to fix and destroy the enemy. A growing proportion of these will be airmobile forces covering vast tracts of land and making swift, deep penetrations with wide dispersion and rapid post-offensive withdrawals to numerous small bases outside the immediate combat area, linked by a communications network. Logistics units will provide support for combat forces with mobility and response ratios approaching one to one. This should eliminate requirements for some echelons of support, and involve the employment of "inventory in motion" techniques with a marked streamlining of the logistics pipeline. Support of Army forces by the Air Force will include direct support to consumers from bases located within the continental Unied States.

Integrated Battlefield Control

The integrated battlefield control system concept, the concept around which the battlefield of the future is being developed, capitalizes on technological advances in sensors, communications, fire direction, and associated automatic data processing capabilities. Already, elements of this system are well down the road in the Army's Automatic Data Systems for the Army in the Field (ADSAF) effort. Within ADSAF fall the Tactical Fire Control System, the Combat Service Support System, and the Tactical Operations System programs. The ADSAF program is a part of the quiet revolution in the Army's capabilities.

With the foregoing as background, let me proceed to a general description of the design for the battlefield of the future. To get at an orderly method of improving operational capability, which is the heart or core of the design, we must work around doctrine, organization and equipment, with the principles of war leading the way. We want to maximize the doctrine of security. Knowledge of the enemy is the first necessity of security; therefore, an organization must be built to gather knowledge of the enemy. A surveillance force is proposed for the purpose of finding the enemy, providing intelligence, and providing target acquisition. This force is not intended to deliberately engage the enemy. Surveillance is a continuing requirement. A dedicated force of approximately 10 percent of the command is envisioned for this purpose.

We estimate that any forward deployed U.S. Forces will have to rely on the principle of economy of force. This will be particularly true of that element we call the restraining force. The major mission of this force is that of blocking, blunting and canalizing the initial enemy offensive. Relying on intelligence developed by the surveillance forces, it must be highly mobile, designed to kill armored formations and supported by flexible firepower. *Wherever possible, these organizations must emphasize replacement of the man by the machine.* They must combine the maximum use of terrain, barrier systems and organic mobility to force the enemy attacking formations into areas best suited for destruction.

We visualize the restraining force as self-contained, self-supporting organizations, capable of fighting until relieved or reinforced by heavier battle forces moved to the areas of greatest threat.

Recognizing the requirement for positive command and control of this phase of the battle, the restraining force will be equipped for rapid passage and processing of information and orders. We might say that in this type of operation, the "instrumented battlefield concept" is best typified. Approximately 20 percent of the command would constitute the restraining force.

Mass and maneuver are associated best as principles of war related to destruction of the enemy in battle. The battle force to best fight the enemy should be organized with a combined arms structure and extensive cross-training. In the interest of responsiveness, ground combat vehicles should be organic to the battle force. Future combat vehicles should exploit new power sources, such as steam or gas turbines together with liquid propellant weapons, to improve mobility and firepower. This basic design of the land combat system leads to further considerations.

Higher Command Echelons

The primary organizational structure consisting of surveillance force, restraining force, and battle force would be found not only in the basic combat unit but repeated through higher echelons for assurance of simplicity and unity of command. Special purpose forces would be found at higher echelons of command.

To permit tailoring of the primary organizational structure, a reinforcing command predominately of combat arms is necessary at high echelons. These organizations, other than general support units, should lend themselves to attachment to the primary organization and, because increased density of equipment is a goal, should have similar equipment to that of the primary organization. Gun-type and utility-type aviation units should be a part of this command. In the interest of commonality of equipment, all prime movers and lift devices should accept a variety of loads such as personnel, weapons, and general cargo.

At some levels, a sustaining command which contains logistic, maintenance, and administrative units is necessary. Improvements in this area are expected to be derived mainly from the use of digital transmission, computerization, and automatic scanning. Coupled with rapid all-weather transport, this should permit reduced forward stocks and dependence on a moving inventory. A high density of common major items of equipment should reduce spare parts requirements and simplify maintenance.

Challenges of the Future

The Army has taken its first steps toward instrumentation of its command and staff functions of the Army in the field. This is the initiation of an expanded instrumented battlefield. When the communication and electronics systems in the command and staff area prove reliable and beneficial in automating staff activities, the instrumented battlefield will be expanded to include tactical operations of a restraining force as previously described.

Still, none of this will happen automatically. Our development effort must be guided by a sound appreciation of past errors, new avenues of approach, and proper allocation of priorities. This is especially crucial as we enter a period of constrained resources in terms of both manpower and cold dollars and cents.

One of the principal challenges before us today is to make the right decisions on how much of our resources must be expended to gain a better balance in land combat functions and, thus, improve greatly our effectiveness in battle.

We have computers, but our achievements in systems engineering are crude when compared to American technological capabilities. We have night vision devices and sensors of varying degrees of sophistication; improvements are needed, however, in equipment ranges, target discrimination, security against countermeasures, and—not the least problem by a long shot—in cost. The Army has the management structure to direct our combined efforts to bring together existing materiel, requirements for new materiel, doctrine, organization, training, and unexpected technological advances to make the battlefield of the future a reality; a battlefield on which the U.S. Army will attain success in battle with greatly increased effectiveness and a greatly reduced cost in human life!

Armored Windshield Ceramic Developed by USAF

A prototype sample of transparent material, suitable for double duty on helicopters as armored windshields, has been developed under the sponsorship of the Air Force Systems Command's Air Force Materials Laboratory (AFML), Wright-Patterson AFB, Ohio. Contractor for the program is AVCO Corp., Applied Technology Division, Lowell, Mass.

The material is polycrystalline magnesium oxide fabricated into an optically transparent ceramic piece 11 inches in diameter and 3/16 of an inch thick. "Hot pressing" was used to manufacture the disc which has an optical transmission of about 80 percent and excellent visual clarity. Ultimate objective of the program is to perfect a reproducible and reliable manufacturing process to produce optically transparent tiles of the material up to 8 by 8 inches with thicknesses of 3/4 of an inch.

Lawrence Kopell of AFML's Manufacturing Technology Division is project engineer.

DDR&E Reorganizes

The Director of Defense Research and Engineering, Dr. John S. Foster Jr., is reorganizing his office in line with the Secretary of Defense's participatory management philosophy on weapon systems acquisition.

The reorganization will reduce the amount of DOD direction and guidance, with a resulting shift from detailed program supervision to long-range coordinated planning. Project approval will remain on the DOD level, but the Services will originate and have primary responsibility for the conduct of the programs.

Reorganization involves two directorates that deal with military programs, Tactical Warfare Programs, and Information and Communcation, and will result with structuring along mission, rather than functional, lines. A third directorate, Strategic and Space Systems, is already organized along mission lines and will not be changed.

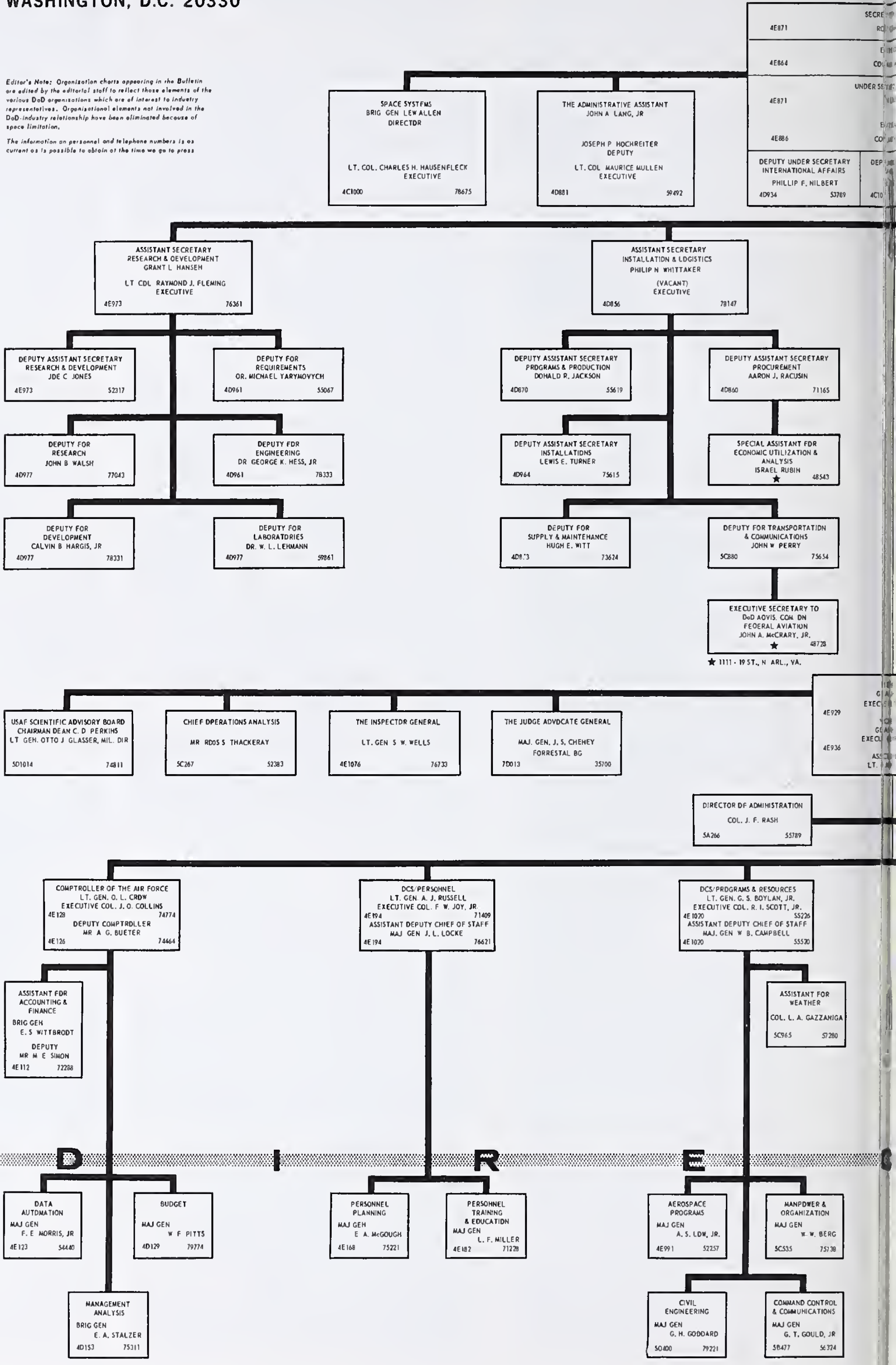
The reorganization is expected to be completed by June 30, 1970, and is expected to allow a 10-percent reduction in personnel strength.

DEPARTMENT

WASHINGTON, D.C. 20330

Editor's Note: Organization charts appearing in the Bulletin are edited by the editorial staff to reflect those elements of the various DoD organizations which are of interest to industry representatives. Organizational elements not involved in the DoD-industry relationship have been eliminated because of space limitation.

The information on personnel and telephone numbers is as current as is possible to obtain at the time we go to press



THE AIR FORCE

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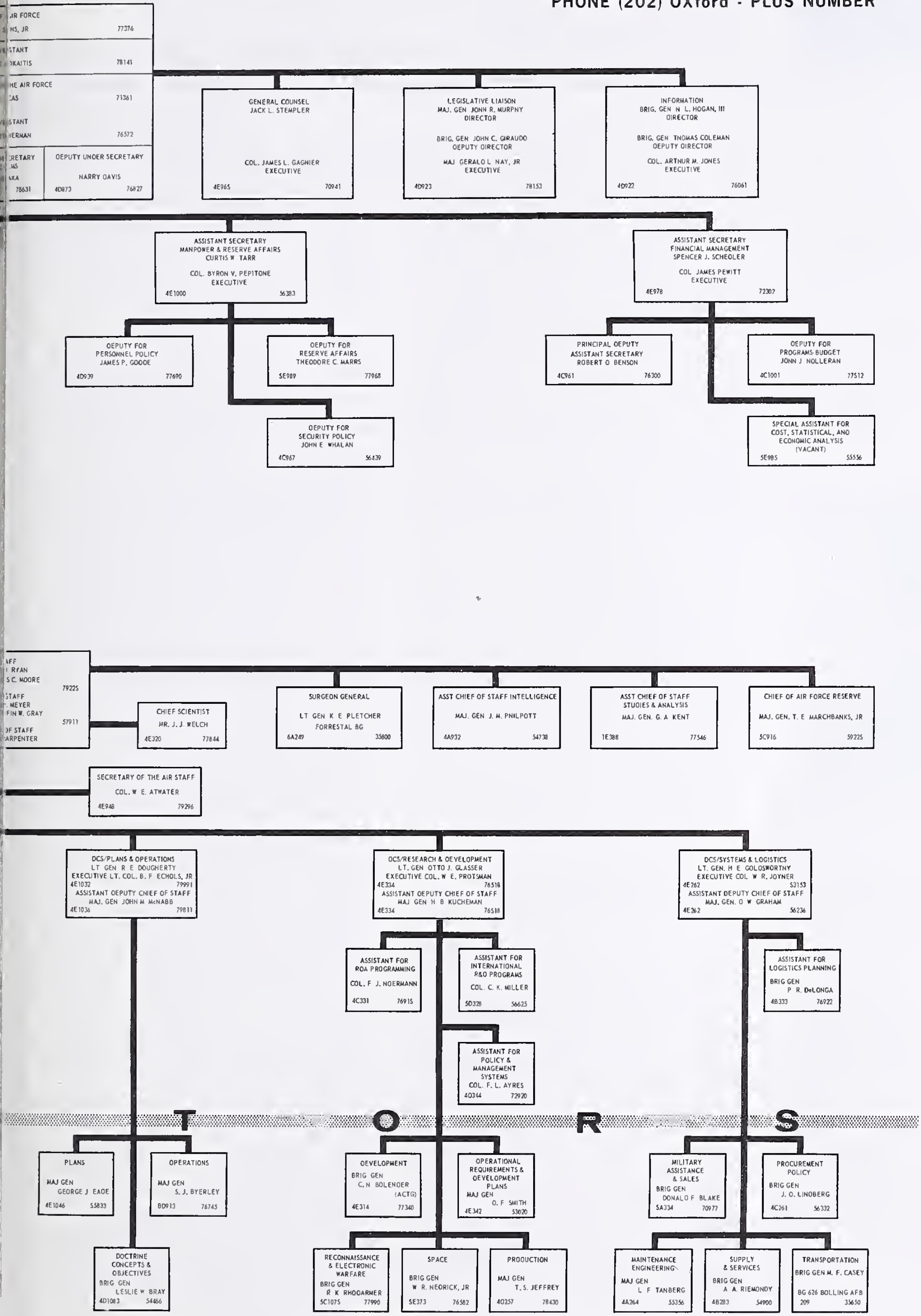

ABOUT PEOPLE

DEPARTMENT OF THE NAVY

VAdm. Arthur R. Gralla, formerly Naval Inspector General, Dept. of the Navy, has been named Commanding Officer, Military Sea Transport Service, Washington. D.C.

RAdm. Roy G. Anderson, who has been serving as Senior Navy Member, Weapon Systems Evaluation Group, Office of Dir., Defense Research and Engineering, has been designated Dir., Long Range Objectives Group, Office of the Chief of Naval Operations.

RAdm Ben B. Pickett has been reassigned from Dir., Fleet Readiness and Training Div., to Dir., Plans and Programs Div., Office of the Chief of Naval Operations.

RAdm (selectee) Donald D. Engen, has been assigned as Dep. Dir., Strategic Plans and Policy Div., Office of Dep. Chief of Naval Operations (Plans and Programs).

RAdm. (selectee) A. R. Marschall, formerly Commanding Officer, Southeast Div., Naval Facilities Engineering Command, Charleston, S.C., has become Dep. Commander, Pacific Div. of the command and Officer in Charge of Construction, Naval Facilities Engineering Command Contracts, Republic of Vietnam. His replacement as Commanding Officer, Southeast Div., is **Capt. Whitney B. Jones**.

DEPARTMENT OF THE ARMY

New assignments in Hq., Dept. of the Army include: **Maj. Gen. Allen M. Burdett, Jr.**. Dir. of Army Aviation Office of Asst. Chief of Staff for Force Development; **Brig. Gen. Bertram K. Gorwitz**, Dep. Chief of Information; and **Col. Theme T. Everton**, Asst. Dep. Chief of Staff for Supply and Maintenance, Office of Dep. Chief of Staff for Logistics.

The Army Materiel Command has consolidated the former Procurement and Production and the Materiel Requirements Directorates into the Directorate of Requirements and Procurement. **Maj. Gen. Felix J. Gerace** heads the new directorate with **Brig. Gen. Frank A. Hinrichs** as Dep. Dir. for Procurement, and **M. D. Finn** as Acting Dep. Dir. for Requirements.

Other assignments in the Army Materiel Command are: **Col. Walter C. Gelini**, Commander, and **Lt. Col. Jay E. Luther**, Coordinator for Research and Development, at the Army Mobility Equipment Research and Development Center, Ft. Belvoir, Va.; and Dr. **Geoffrey E. H. Ballard**, Dir. of the Institute for Exploratory Research, Army Electronics Command, Ft. Monmouth, N.J.

Brig. Gen. Edward B. Kitchens Jr. is the new Commander, Army Combat Developments Command Combat Arms Group, Ft. Leavenworth, Kan.; **Col. Thomas W. Brown** has assumed the post of Commander, Army Combat Developments Command Experimentation Command, Ft. Ord, Calif.; and **Col. Walter R. Harris** is the new Commanding Officer, Army Combat Developments Command Field Artillery Agency, Ft. Sill, Okla.

DEPARTMENT OF THE AIR FORCE

New assignments to major command positions announced by the Air Force include: **Lt. Gen. Thomas K. McGhee**, Commander, Aerospace Defense Command, Ent AFB, Colo.; **Lt. Gen. Francis C. Gideon**, Vice Commander, Air Force Logistics Command, Wright-Patterson AFB, Ohio; and **Lt. Gen. (selectee) James C. Sherrill**, Vice Commander, Military Airlift Command, Scott AFB, Ill.

New assignments in Hq., USAF, are: **Maj. Gen. John M. McNabb**, Asst. Dep. Chief of Staff, Plans and Operations; **Maj. Gen. George J. Eade**, Dir. of Plans, Office of Dep. Chief of Staff, Plans and Operations; and **Maj. Gen. Henry B. Kucheman Jr.**, Asst. Dep. Chief of Staff, Research and Development.

Brig. Gen. Donald F. Blake has become Dir. of Military Assistant and Sales, Office of Dep. Chief of Staff, Systems and Logistics, Hq, USAF, replacing **Brig. Gen. Harold V. Larson** who retired on Feb. 1.

Brig. Gen. Otis E. Winn has been assigned to the Military Traffic Management and Terminal Service, Washington, D.C., as Dep. Commander for Resources and Management. He replaces **Brig. Gen. Thomas L. Hayes** who retired on Feb. 1.

At Hq., Air Force Logistics Command, Wright-Patterson AFB, Ohio, the command's Advanced Logistics System Center was merged with the Comptroller office on Feb. 1. **Maj. Gen. Joseph R. DeLuca**, who formerly commanded the center became AFLC Comptroller and will head the combined organization. He replaced **Brig. Gen. John French** who retired on Feb. 1. Also in AFLC, **Brig. Gen. (selectee) Wesley L. Pendergraft** has been assigned as Vice Commander, Ogden Air Materiel Area, Hill AFB, Utah.

Personnel changes at Hq., Air Force Systems Command, Andrews AFB, Washington, D.C. are: **Maj. Gen. John L. Martin Jr.**, Asst. to Commander, AFSC, for Systems Acquisition Management, has retired (no replacement named at press time); and **Col. Leslie L. Dunning** and **Col. Richard E. Griffin** has been named Asst. and Dep. Asst. for the F–111 Program, respectively.

New assignments in the Office of Aerospace Research (OAR) are: Col. **Donald C. Kipfer**, Asst. Dep. Chief of Staff, Plans and Programs, Hq., OAR, 1400 Wilson Blvd., Arlington, Va.; and Col. **Charles A. Smith** will replace Col. **Orville J. Kvamme** as Vice Commander, Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Mass. Col. Kvamme will become commander of the European Office of Aerospace Research in July 1970.

Cost Management—Set Goals Measure Progress Correct Problems

Brigadier General Harold C. Teubner, USAF

Distinctions between cost management, cost tracking, and cost control have become clouded. This is not difficult to understand because these functions are highly interrelated. Either of the latter two functions possesses peculiar objectives of cost management, yet alone they are not sum and substance of cost management. The Air Force Systems Command has a major responsibility in the area of cost management which, necessarily, extends to defense contractors performing on major aerospace weapon system programs.

In a large view, cost management is the process of establishing achievable goals and the significant steps necessary to achieve them within a time schedule and planned cost, and of measuring progress along a predetermined path. Progress along this path is reviewed when deviations occur, or circumstances suggest the need to revise either the goals or the route toward their achievement. A cost management information system reflects these goals, the status of progress, and possible problems (either trends or occurrences) which may identify the need for corrective action.

A cost management system must, of necessity, include both the elements of information and formulation of alternatives, their selection and execution. In complex weapon systems development and acquisition processes, there must occur iterative cycles of planning, identifying new or previously unidentified problems and their causal factors, selecting action and executing. Cost management is both acquisition of meaningful information and judicious application of this knowledge to assist in follow-through management. Cost estimate tracking and cost control are both tools (information) and management processes that contribute to the total of cost management.

Cost Tracking

A historical record of cost estimates, changes in estimates, and reasons for the changes, in sufficient detail to reconstruct a running and credible explanation of what has happened, allows management to grasp quickly significant facts concerning estimate trends and reasons for growth in the estimate. Derived background information on the cost track complements the record with an explanation of the cost growth, and materially aids justification of funds requirements.

Cost estimate tracking is a tool for the derivation of information but it does not, in itself, derive the background information. Instead, it isolates or defines estimate areas requiring more detailed attention, and the manner in which estimate data will be

Brigadier General Harold C. Teubner, USAF, has been Deputy Chief of Staff (Comptroller), Air Force Systems Command, since 1967. His previous assignment was Deputy Director of the Budget, Hq., U.S. Air Force. His military career has included assignments in operations and research and development. He holds a bachelor of science, Texas A. and M., master of science, Massachusetts Institute of Technology, and master of business administration, George Washington University. He also was graduated from the Air War College and Industrial College of the Armed Forces.

exploded downward for greater visibility. Procuring weapon systems is unlike buying off-the-shelf items, where comparison of prices is possible before selecting a given manufacturer's product. Instead, a determination of resources required to produce a complex system must be made based on historical records on analogous systems and from knowledgeable forecasts of needs, and then reduce these data to dollars. This reduction of resource requirements to dollars introduces the added problem of the changing value of the dollar over time. Thus, estimate tracking serves a dual purpose: tracking and evaluating dynamic departures from estimates that bear upon the immediate contract, and updating cost estimates for application to future programs.

Cost Control

It is a relatively easy task to establish controls; it is more difficult to operate them. Control mechanisms are employed to assist management and managers. The managerial function of control is measurement and correction of performance to assure that organizational objectives are reached. The management function of control seeks to compel events to conform to plans. Thus, control systems are regulators only to the extent that they define who is to regulate, and what is to be regulated. They define events to be controlled and, more important, they define the response, *i.e.*, management action. The quality of the control system and the degree to which it is understood by the "controller," who is the man in the control system, is very significant. A traffic signal, as an example, is part of a traffic control system. It can change colors all day long and not control anything if responsive actions are not taken by the pedestrian manager and the vehicular manager.

Misunderstanding of the cost control concept has increased with the dynamic growth of data processing capabilities. What has resulted is an obliteration of the distinctions between clerical decisions and management decisions. A clerical decision is one in which all the facts are known and pre-selected alternatives can be applied to the exact conditions that justify them. In a management decision, all the facts are not precisely defined and the one best alternative is not so easily discerned. There are elements of both in a cost control system. Automatic data processing has provided ability to gain more data that assist in properly reclassifying some management decisions as clerical decisions. Clerical decisions can be programmed for direct responses to a management decision that has already been determined. Many tangible and intangible factors still exist in the technology and in the environment of weapon systems acquisition and management. This fact precludes early elimination of all management judgments by a totally mechanized management control system. The man in management is still a necessary element of the control system.

Cost/Schedule Control System Criteria

Cost estimate tracking, cost control, and cost information systems are elements of the larger cost management system. Well known by implementation is the specification or set of criteria for control systems, formerly known as the Cost/Schedule Planning and Control Specification, but now adopted DOD-wide as the Cost/Schedule Control System Criteria (C/SCSC). The control system resulting from the application of these criteria is extensively coupled with other subsidiary systems included in the overall cost management system. In many respects, C/SCSC extends basic parameters of other subsidiary cost management systems. This is done primarily through commonality of component elements, and extending common elements to serve a more discrete performance measurement function.

Basically, C/SCSC provides criteria for contractors' internal cost and schedule control systems that are coupled with each other and with other components of the cost management system. The same elements of these systems, that serve to support objectives of other cost management subsystems, are used as the foundation of cost and schedule performance measurement. Performance measurement, in turn, is directly related to the performers responsible for follow-through or feedback. C/SCSC builds upon the use of control features that more accurately represent a measure of the work being performed, as it is understood by those accomplishing the many tasks. It provides for classification and grouping of management information to make it more meaningful for the specific management level that will use it.

In this respect, C/SCSC organizes management and the information that supports the management process by both program configuration and functional structure. Inherent in the concept is the assumption that upper levels of management are more effective in evaluating and acting upon program status and program future in larger segments. Operational levels are more effective in evaluating and acting upon management information concerning near-term events, for this is the way their work and responsibilities are assigned. Logic, traceability and credibility of data provided to top management is dependent upon these data being derived from various additions and summaries of the same basic management information that serves operating levels (see Figure 1).

Major Action Elements

The three major action elements in a cost control system are approached by C/SCSC in the following manner:

Identification of What Is To Be Measured and Results from the Planning Process

All resources known or expected to be applied toward meeting program objectives must be planned for. Planning is performed in terms of the inputs, men, time, and other resources required to provide given output. Several control measurements are necessary:

- Functional control, by category and related cost elements.
- Organizational control, by the organization or suborganization assigned task responsibility.
- Financial control, its budgetary process and measurement of its accomplishments.

- Schedule control, application of resources in a timely manner to accomplish program objectives.
- Product control, measuring the output to date and forecasting future output to be obtained from the application of given resources.

Coupling of control systems is best obtained when planning includes these interrelationships. Planning must result from the definition of the work, who is to perform it, estimate of resources required, and period of performance. All are criteria requirements.

Coupling of Related Disciplines that Serve Common and Individual Objectives

Contributing systems can be integrated by translation between systems, *i.e.*, conversion through some interface so that they address some summary management requirement. A more direct integration is that which is built into C/SCSC. Two areas illustrate this coupling feature:

- *Related Disciplines.* Inherent in all management systems are the disciplines of planning, budgeting, work authorization, and cost and schedule determination. These disciplines must be coupled together to achieve maximum effectiveness and to assure consistency: planned work must be adapted to budget limitations; work authorized to perform planned tasks must be consistent with the budget; tasks introduced into the planning process must be derived from the contract objectives. Determination of cost and schedule status must follow the work planned, budgeted and authorized.
- *Cost Elements and Cost Categories.* Cost elements are direct labor hours and dollars, material dollars, and other direct costs. Cost categories are classification of the costs by functional inputs to product components and component subdivisions. They are coupled as in this example. Direct labor hours are accumulated to support many requirements. Total hours are segregated into functional categories: hours needed to perform work on a given component or subcomponent of the program; and unit costs and classification by recurring and nonrecurring costs, and by types of funding dollars. These summaries directly support cost estimate tracking and cost information reports.

The process starts with manhours estimated and expended for the lowest level of work indenture. C/SCSC work packages, therefore, were created on this same basis. Performance is measured by the application of cost elements to the lowest level of resources application. Although work packages may be a larger aggregate of the lowest planning unit, they are exact additions of these lower planning units. Thus, the same base that serves a higher purpose in cost estimating or cost information systems is the base for performance measurement.

Performance measurement units derived in C/SCSC have a direct relationship with other cost management systems. Related work packages are summed into cost accounts that are functional in nature, with separate identification of cost elements. By their functional nature, cost accounts are components in a specific functional control. Because cost accounts represent functional effort, the total of the several functional inputs summarizes the cost of the contract end item. Similarly, a single functional input can be discretely identified in a contract end item or a work breakdown structure (WBS) element (see Figure 2, page 24).

Further classification of cost accounts by recurring or nonrecurring work permits development of appropriate cost accounts and their summaries to provide the manager not only performance measurement, but tracking of estimate performance and related progress toward discrete objectives by this and other classifications. The same base data, thus, is more fully exercised.

Feedback into the Management System To Provide Knowledge on Status of Program

Feedback is the process whereby the results of yesterday's operations are applied to and affect tomorrow's operations. Feedback is not only relating what has occurred and why, but is application of this new learning and experience into the management of tomorrow's operations. This impacts

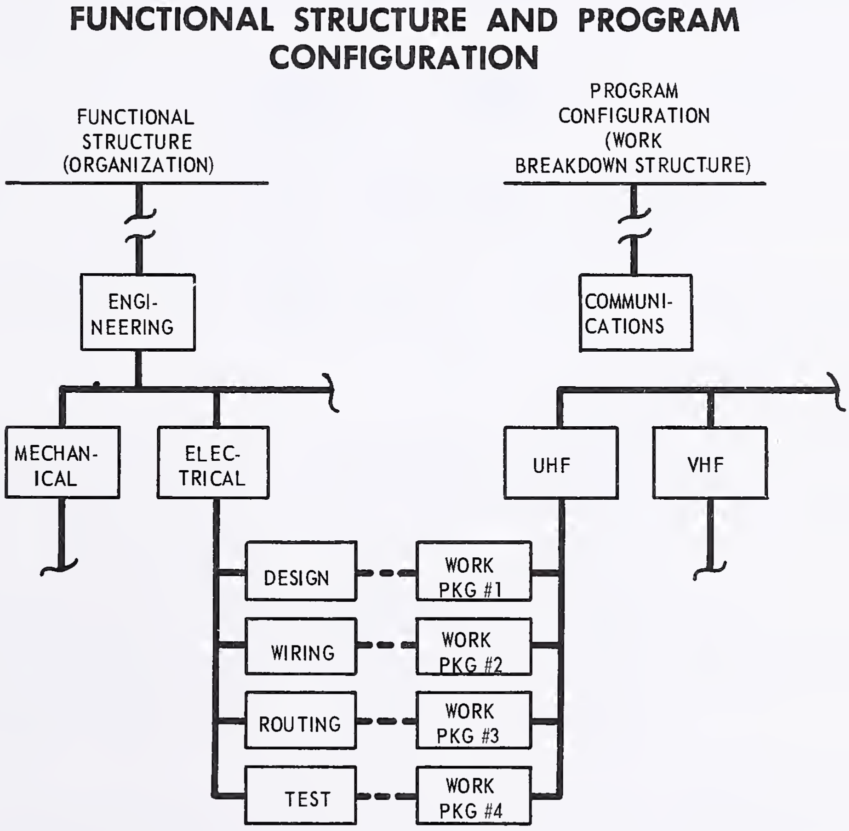
FUNCTIONAL STRUCTURE AND PROGRAM CONFIGURATION
FUNCTIONAL STRUCTURE (ORGANIZATION)
PROGRAM CONFIGURATION (WORK BREAKDOWN STRUCTURE)
ENGINEERING
COMMUNICATIONS
MECHANICAL
ELECTRICAL
UHF
VHF
DESIGN
WIRING
ROUTING
TEST
WORK PKG #1
WORK PKG #2
WORK PKG #3
WORK PKG #4

Figure 1.

upon the entire cost and schedule control system because what has already occurred obviously cannot be controlled. All that is left to control is what lies ahead. Thus, feedback defines forward control and actions taken to achieve desired control limits.

Variance Analysis

The heart of an operating cost/schedule control system is variance analysis. It is not enough to know where cost is departing from predetermined controls. Factors underlying this departure must also be discovered. Though much has been made of traceability and credibility of summarized management information, status alone is not enough. Disengagement of the Government from detailed contract management should not be confused with disengagement by the contractor from detailed program management.

The nature of the cause of variances becomes more discrete and subject to better control as it is broken down level by level. For example, net variance is the algebraic sum of all variances program-wide, but both favorable and unfavorable variances must be examined in depth. Both must be exploded at succeeding levels to isolate them by program segment (WBS element) and functional variance.

FUNCTIONAL/ORGANIZATIONAL RELATIONSHIPS TO WORK BREAKDOWN STRUCTURE ELEMENTS

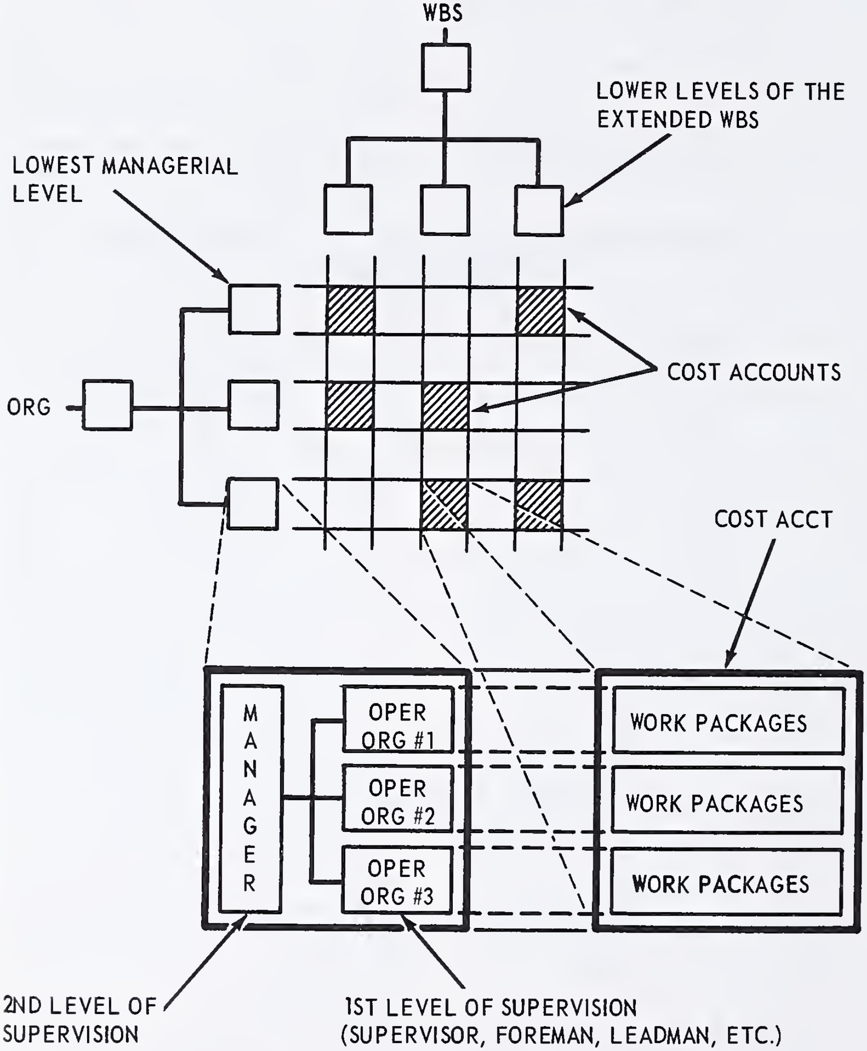

Figure 2.

At the cost account level, variances are more meaningful in that they now relate to the program segment by cost category (see Figure 3). Even this is not enough. For example, a large variance in test operations may not necessarily indicate that the test is out of control. It may very well be a symptom of a problem in another area. Test cost overrun may be the result of poor materials, inadequate design, or manufacturing problems.

Cost account variance must lead to determination of the original cause. When cause is found in another functional area, variance analysis cannot stop at this point. Variance analysis in all areas where costs are incurred should reveal whether variances result from any one, or a combination, of the following factors:

- Estimates in use.
- Labor skills applied versus plan or need.
- Inadequate planning.
- Rework.
- Faulty materials.
- Increased labor rates and material costs.
- Relaxation of management discipline.
- Unforeseen requirements to meet scope of objectives.

Fundamentally, variance analysis is the highlighting of individual factors that contribute to a departure from control standards. It is an instrument for measuring progress and for estimating future requirements, based upon confirmed knowledge of behavior to date. Control cannot be exercised without knowledge of what is to be controlled, establishing control parameters and, more important, segregating the causes of variance to assist in defining updated control to remaining work. Excellent control practices may be put into effect, yet not address the real factors to be controlled. C/SCSC is intended to assure the existence of a cost/schedule control system which will assist management to better define what is out of control and, by appropriate action, to control the defined problems rather than symptoms of the problem.

In summary, C/SCSC is a criteria

TRACEABILITY

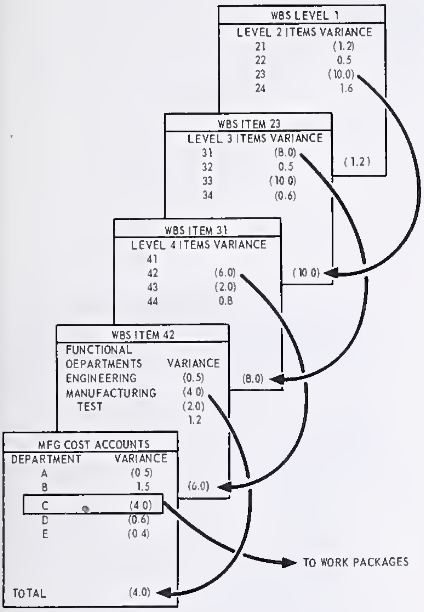

Figure 3.

or specification neither for a total cost management system, nor for a cost tracking or cost information system. It calls for a cost/schedule control system to couple these subsystems where direct and indirect relationships are known. It calls for a system to establish control requirements and a system to determine when control should be exercised and what is to be controlled.

YF–12A Flies Again for NASA-Air Force

A joint Air Force and National Aeronautics and Space Administration (NASA) research program has put the YF–12A back in the air over Edwards AFB, Calif.

Initiated last July, the project will use two Air Force YF–12As for supersonic cruise research. Under the terms of the program, NASA will budget for and fund the tests through FY 1974, at an estimated $10 million. The Air Force will supply spare parts, associated ground equipment, base support and maintenance personnel.

The test program is intended to fill a development gap left by the termination of the X–15 and XB–70 programs in early 1969. Funds from these programs were made available for the YF–12A project.

The project is divided into two phases, with the Air Force and NASA each handling one. Phase one, under Air Force control, is oriented toward seeking additional data on operational factors, development of procedures, and establishment of limitations relating to command and control problems.

NASA, in phase two, will seek altitude-hold data at supersonic speeds, and data concerning boundary layer noise, heat transfer under high speed conditions, airframe-propulsion system interactions involving effects of engine inlet performance, and handling and performance characteristics.

Navy Plans Research Rocket Launches

The Naval Ordnance Missile Test Facility, White Sands Missile Range, N.M., has announced the scheduling of 80 sounding rocket firings for 1970.

More than one half of the launchings will be of the Aerobee 150, a low-cost research rocket designed to carry scientific payloads to altitudes of 70 to 190 miles. More powerful Aerobee 170 and 350 rockets, capable of reaching heights of 200 and 294 miles, respectively, with increased payloads, will account for 21 launches.

Also included in the firing schedule are 11 Nike-Apache and 2 Nike-Cajun vehicles.

The rocket launchings are conducted in conjunction with the National Aeronautics and Space Administration, the Air Force, the Naval Research Laboratory, Washington, D..C, and the Kitt Peak Observatory, Ariz. Research activities include studies of solar flares, micrometeor detection, magnetic fields, and other upper atmospheric phenomena.

Universities and other government agencies provide research criteria for the individual projects.

MBT Development Program Reoriented

Deputy Secretary of Defense David Packard has announced that the Army will reorient its Main Battle Tank (MBT) development program to reduce procurement costs, simplify operation and maintenance, and improve reliability.

The modified bi-national MBT program involves revision of the joint development relationship which the United States and the Federal Republic of Germany have had since 1963. Each country will now assume unilateral technical decisions and unilateral funding.

Exchange of information and support will continue, but now each country will also unilaterally fund materials and services it requests from the other country.

To achieve the goals of the revised program will require redesign of selected components, including the fire control, stabilization and secondary weapon systems. Specific figures on the cost reduction will not be available until final design definition, about June 1970.

The new program provides for the first U.S. production of the modified MBT in the mid-1970s.

USAF Contracts for Beryllium Studies

The Air Force has awarded a contract to North American Rockwell Corp., Los Angeles, Calif., for an analytical and experimental investigation of advanced beryllium structures.

Objects of the program are to develop and demonstrate beryllium configurations that are capable of overcoming or reducing the brittle failure characteristic of commercially available beryllium products, especially cross-rolled sheet.

Laminating and cladding beryllium with more ductile materials will be studied, and selected configurations will be fabricated, tested and analyzed to see if they can carry complex loads and withstand impact.

The investigation is being conducted for the Air Force Flight Dynamics Laboratory, Wright-Patterson AFB, Ohio. Edward Barnett is the laboratory engineer on the project.

FROM THE SPEAKERS ROSTRUM

New Approaches in Major Weapon System Contracting

Excerpt from a speech by Hon. Philip N. Whittaker, Asst. Secretary of the Air Force (Installations and Logistics), to the Dayton, Ohio, chapter of the National Contract Management Association, Jan. 15, 1970.

* * * * *

Prior to the fall of 1968, the Air Force was engaged in formulating the concept for a new advanced tactical fighter which we then called the F–X. On Sept. 28, 1968, the Deputy Secretary of Defense approved the initiation of contract definition. Throughout concept formulation, we had been concerned about two things. One was describing the requirements for an airplane adequate to do its job into the mid-1980 time period, some 15 to 17 years later, and the other was developing a program with the necessary contractual vehicles to assure acquiring a weapon system modern and versatile enough to meet those requirements.

A request for proposal (RFP) was issued, and, in December 1968, three companies (Fairchild-Hiller, McDonnell-Douglas, and North American Rockwell) received contract definition contracts. During the contract definition period, we continued to review our experience with other programs and contracts and made changes in the F–15 contract approach based on this experience.

Just before Christmas 1969, we awarded the F–15 acquisition contract . . . to McDonnell-Douglas Corp. This contract is representative of the present trend in the system acquisition process in the Air Force. In order to reflect some of our current thinking to you, I would like to describe some of the principal features of that contract.

In accordance with the contract, the F–15 will be a single-place twin-engine jet fighter designed to carry both a gun and air-to-air missiles. Development plus 20 test aircraft and the test support are included in the contract at a target price of slightly over $1.1 billion. In addition, we have production options to purchase 107 operational systems.

The F–15 procurement approach emphasizes system performance, program control, low production cost and realism of cost estimates. The contract is structured to provide the flexibility necessary to develop a superior aircraft while controlling costs, and still provide positive incentives to do the best possible engineering job in the early stages of the program. An innovative development program, it encourages design excellence pointed toward production of a superior fighter at minimum cost.

Continuing Visibility

Milestones have been incorporated into the contract to assure that the Government has the visibility to control costs, schedules, and performance. The contractor must demonstrate successful accomplishment of defined tasks at the specified times to the government's satisfaction before production commitments are made. Certain milestone events during the performance of the contract have been established; an exhibit to the contract describes the demonstration milestones, the dates by which they will be accomplished, and the criteria for measurement. These are significant technical achievements such as preliminary and

Philip N. Whittaker is Assistant Secretary of the Air Force (Installations and Logistics). Previously he was Assistant Administrator for Industry Affairs, National Aeronautics and Space Administration. He was a vice president of International Business Machines Corp. before entering Government service. He was also a member of the Board of Advisors of the National Contract Management Association.

critical design reviews, component and subsystem demonstration tests, avionics fly-off, prototype engine tests, crew escape system tests, and the like.

If the contractor does not satisfactorily accomplish a demonstration milestone, the Government has the right to defer its commitment to the production, in whole or in part, until the milestone has been satisfactorily accomplished. In such a case, the production schedule may be (at the Air Force's option) slipped with no adjustment in contract prices or ceilings. Thus, high dollar commitments for production are avoided until there is reasonable assurance of success. Our commitments will progress only as development progresses, until development has reached a point where technological unknowns or uncertainties have been resolved or minimized. Production can then be undertaken with confidence in the basic design and demonstrated performance.

Contract Structure

To achieve system performance, program control and low production cost, and to best implement the milestone approach, the Air Force combined cost reimbursable and fixed-price contracting features into a single unique contract. The combination Cost Plus Incentive Fee/Fixed Price Incentive with Successive Targets (CPIF/FPIS) contract contains design, development and test efforts, test aircraft, production quantities for the first wing, and options for additional production lots for two more wings.

Specifically, the contract contains three parts.

Part 1 is on a CPIF basis and includes the cost of design, development test and test support. The CPIF portion reimburses the contractor for all of his costs reasonably incurred in the performance of the developmental work. It includes a minimum and maximum fee and a prenegotiated incentive cost sharing formula. A cost type contract was used to encourage technical objectives without subjecting the contractor to undue risks. It should also allow the exercise of that type of close government control envisioned.

Parts 2 and 3 of the contract are on a FPIS basis.

Part 2 includes the 20 test aircraft, test support equipment, spare parts and ground support equipment to support the test program.

Part 3 includes the first wing of 107 operational aircraft, plus technical data and handbooks and certain training equipment. Spare parts and aerospace ground equipment will be separately provisioned and priced.

Reflecting Risks

To better reflect the risks to the Government and to the contractor, fixed-price incentive provisions were used rather than the firm fixed-price type. These provisions include the opportunity for revision of target costs at relatively early points in the production phase, based on actual costs experienced, but with firm price ceilings which can only be revised downward. Each of these contract parts has its own cost incentives which operate independently. Not-to-exceed ceiling price options have been obtained for the second and third wings of operational aircraft. When we elect to exercise these options, contractual targets and revised ceilings will be negotiated with the contractor. The F–15 engines will be furnished to the airframe contractor as government-furnished property. The F–15 engine source selection is currently near completion.

Total System Performance

Not all of our lessons learned have been unhappy ones. Accordingly, we have preserved some of the arrangements used in the past and have employed them in the F–15 with refinements. Our approach to Total Systems Performance Responsibility is a case in point.

We have found that disputes frequently arise regarding responsibility for system performance where there are major items of government-furnished property. It is desirable to hold the system contractor responsible for overall performance; practically, this is not feasible unless all subsystems are contractor-furnished. Our Total System Performance Responsibility (TSPR) clause in the F–15, I believe, resolves this problem. For illustrative purposes, let us discuss the government-furnished engines.

Before source selection, each prospective airframe contractor was required to negotiate a collateral arrangement with each of the prospective engine manufacturers. The Government is not a party to these agreements. Basically, they provide that, in the event of a deficiency in the system having any relationship to the engine, the deficiency would be corrected and the costs allocated in accordance with the terms of that agreement. Of course, before the agreement is implemented, there must be evidence of the fact that the engine met the required specifications. The contracts spell out what the performance of the engine must be and the right of the system contractor to observe acceptance testing. However, once the engine has met the specifications and has passed its tests, acceptance imposes total responsibility on the system contractor. If problems crop up later, other than such things as latent defects, the system contractor's recourse is to the collateral agreement. Work done under the collateral agreement is not a basis for adjustment of any contract target or ceiling prices.

Under this arrangement, the Air Force does not become involved in the "finger pointing" arguments between the prime contractor and the engine manufacturer. This means fewer disputes, fewer directed changes, less undefinitized work effort, and the benefit of pricing this risk element in the competitive environment preceding source selection.

I believe this F–15 acquisition approach is conducive to obtaining an air superiority fighter, with the necessary capabilities, at the lowest possible cost. By coupling production releases to successful accomplishment of significant demonstrable development milestones, a positive means of controlling costs over both the CPIF development and the FPIS production portions can be better achieved.

Orderly Contract Performance

In the F–15, we are trying to proceed both in development and in production in an orderly fashion. The principal aspect of our approach is that the initial operating capability (IOC) date is no longer inviolate. When we slip our commitment to production because of unsatisfactory milestone demonstration, we are also slipping delivery dates, for production leadtime will remain constant. When, and to what extent, we commit funds to production is not based on a calendar date set forth in the contract; rather, it is a function of demonstrated technical accomplishment and risk assessment. If the contractor's development proceeds in accordance with the plan, we commence production in accordance with the contract and the IOC date will be met. If development slips, we have the right to slip production. If production slips, the IOC date slips. It's just that simple.

Funding Plan

Even in development, we have set forth an orderly funding plan which is tied into the contractor's plan. While we will pay all costs up to the total estimated cost of development, less the contractor's share, we will not revise the funding plan during the year if the contractor runs into trouble and needs more money. He must continue to work toward the demonstration of a milestone even if it means exceeding the limits of the incremental funding plan. In order for us to consider an adjustment to that plan, the contractor must furnish notice commensurate with leadtime in the budget cycle. That amounts to 17 months. In the interim, he runs the risk, in the event of termination, of not being covered for costs incurred in excess of the funding plan. We believe this approach is well calculated to surface early and realistic notice of overruns, and will induce the contractor to plan his work carefully and then work his plan during development.

On the other hand, there are risks which would be unreasonable to pass completely on to the contractor, *e.g.*, runaway inflation. . . . We have, therefore, a provision in the contract to adjust the ceiling option prices for the second and third wings for abnormal escalation. The factors we are considering are labor and material costs, and adjustment only to the ceiling price.

Room To Improve

Let it be clearly understood that what I have explained is not represented to be perfection, but only the best to date. We intend to improve our contracting as we learn more and as we acquire actual experience in the administration of the milestone concept. Also, I do not want to leave the impression that this is all that we have done, are doing, or will do. There are many other important efforts underway.

One is the use of a specification approach to systems engineering management in place of the cumbersome and costly 375–5 approach. The new Military Standard 499 has been included in the F–15 and AWACS [Airborne Warning and Control System] contracts to give us some experience with this way of requiring systems engineering. We are very interested in the results of these two trials and will, therefore, be watching the progress closely. We expect that the use of the military standard will not only be less restrictive on the contractor's efforts, but also should result in systems engineering at less cost to the Government.

Closely akin to systems engineering is the concept of integrated logistic support, embodying all the elements necessary to assure the effective and economical support of a system at all levels of maintenance for its entire life. We have long known that acquisition cost is only a fraction of the total cost of a system over its lifetime. . . .

By assuring that the support needs for new systems is adequately considered and included in the initial design and development concepts, we feel we are attacking one of our largest cost areas. These actions must be taken during the acquisition time period. Each of the competitors for the F–15 contract developed a full integrated logistic support plan for their proposals.

Another interesting trend in systems acquisition is the recurring discussions on the use of prototypes. We are searching for ways to authentically determine system performance prior to a large commitment to production and to use this determination as an aid in selecting the contractor who will do the best job for the Air Force. Prototypes may be the answer if their manufacture and testing is economical in relation to the total program. . . .

Tailored Weather Data System Planned

Custom-tailored weather data will soon be provided by a system under design by the Air Force Systems Command's Electronic Systems Division (ESD), L. G. Hanscom Field, Mass. Depending on how the modules are linked up or tied into the system, it will "tailor" information to meet various needs. For example, it will provide strike crews inflight and target weather data as well as terminal forecasts, or it will also provide weather forecast requirements, far larger and more general in scope, to a force commander for target assignments.

The new Tactical Weather System (TACWE) will be acquired by the ESD Aerospace Instrumentation Program Office. It will support Air Force tactical command and control system elements in any theater of operations, and provide needed meteorological information for contingencies such as brushfire wars, emergency airlift, and natural disasters.

Three basic modules will make up the system: meteorological facilities, teletype facsimile, and a radio intercept module. Also, in some instances, there will be a powerful radio transmitter.

Requests for proposal are expected to be sought early in 1970.

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RESEARCH REPORTS

Organizations registered for service may obtain microfiche copies of these documents without charge from:

Defense Documentation Center
Cameron Station
Alexandria, Va. 22314.

All organizations may purchase microfiche copies (65¢) or full-size copies ($3) of the documents (unless otherwise indicated) from:

Clearinghouse for Federal and Scientific Information
Department of Commerce
Springfield. Va. 22151

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These publications may be purchased at the prices indicated from:

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402.

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Defense Construction Supply Center

Wire, Lumber, Repair Parts

Major General Emmett M. Tally Jr., USAF

Rolls of concertina wire and tape. Barbed wire and tape. Landing mat and T–17 membrane. Fence posts.

Although these items have been recent "best sellers," they are only 4 of the 494,000 items of military supply managed at the Defense Construction Supply Center (DCSC), at Columbus, Ohio. Since its establishment in January 1962, DCSC has been the principal source of construction material, automotive and construction equipment components and repair parts used by the Military Services.

The center, a field activity of the Defense Supply Agency (DSA), provides the Army, Navy, Air Force and Marine Corps (its customers) with common commercial type items, such as lumber and plumbing accessories, and complex repair parts for mechanical, construction, material handling, and automotive equipment, and for aircraft, ships, submarines, combat vehicles and missile systems.

Procurement and Supply Mission

Today DCSC actually "wears two hats" in the DSA logistics system. It is a DOD integrated manager—an Inventory Control Point—for the increasingly computerized management of our assigned items of supply. The other "hat," or second primary mission, is that of a storage and distribution depot. DCSC is one of seven principal storage depots in the DSA system.

At the end of FY 1969, 791,800 DOD items in 82 Federal Supply Classes were assigned to DCSC for integrated management. Of this total, DCSC centrally manages and procures 494,000 items. Of the remaining 298,000 items, 100,100 have been authorized for local purchase by using Service activities. Some 171,600 items have been retained for management by the Services and other agencies, and approximately 26,100 items remain to be classified as to method of management.

In addition, DCSC also provides item support for the Army and Air Force overseas for non-cataloged items—those without assigned Federal Stock Numbers.

Figure 1 cites statistics reflecting DCSC activity between FY 1966 and FY 1969, in our initial primary mission—the management of Inventory Control Point operation.

In addition to purchasing the material under its cognizance as an integrated item manager, DCSC also purchases items managed by the Military Services under the DOD Coordinated Procurement Program, upon receipt of Military Interdepartmental Purchase Requests. Purchases in this program have increased steadily—from $9.1 million in FY 1964 to $106 million in FY 1968, and to $133.5 million in FY 1969.

Unique aspects of the DCSC procurement function include two offices for the purchase of lumber—one at Atlanta, Ga., and one at Portland, Ore. Lumber purchases totaled some $119.9 million during FY 1968. DCSC also buys automatic data processing equipment for all DSA ac-

Major General Emmett M. Tally Jr., USAF, has been Commander of the Defense Construction Supply Agency since September 1967. From 1962 to 1967, he was assigned to Headquarters, Air Force Logistics Command, where he served successively as Director of Data Systems, Deputy Director of Operations, Deputy Director and later as Director of Supply. General Tally holds a bachelor of laws degree from the University of Florida.

tivities and does specialized contracting for the Defense Documentation Center.

The principal DCSC procurement objective, of course, is to buy materiel to satisfy customer demands in the most effective and economical manner. Additional objectives are to maximize competition to encourage participation of small business and firms in labor surplus areas, and to involve firms in labor surplus areas in industry-government programs for the disadvantaged.

Several methods are employed to attain these objectives. A Bidders List System is considered to be the most important. To date, more than 6,000 firms are included on the DCSC Bidders List.

Another method used is the semiannual forecast of anticipated procurements over $10,000. This is a system by which DCSC and other federal agencies submit a daily listing of all proposed unclassified procurements over $10,000 each to the Department of Commerce. These are then published in the Department of Commerce publication *Commerce Business Daily*.

During FY 1969, DCSC completed approximately 207,622 procurement actions which covered about 420,000 individual line items. Of the total procurement dollar value of $555.4 million in FY 1969, 66.8 percent was made on a competitive basis; small business awards amounted to 49.1 percent of the total dollar value of domestic awards ($506.7 million). Labor surplus/distressed area awards by preference amounted to $19.6 million. In addition to this, a program is underway to encourage the hiring of the disadvantaged by those firms in or near hard core areas of the minority population who are, or could be, doing business with the Government.

Improving Procurement Process

The most challenging activity and continually the most difficult is the procurement area. Much of the difficulty can be attributed to the lack of technical data and prior purchase data for items managed by DCSC. Many of these items are used to support old, and sometimes obsolete equipment, purchased by the Services in years past.

This situation has dictated the use of considerable manpower, on a continuous basis, in an effort to obtain the required data from either the Military Services or industry. Much progress had been made in this area, but efforts to improve procurement techniques continue.

Many actions have been taken by DCSC in this endeavor, most of which have been efforts toward broadening the knowledge of our procurement personnel. Some of these actions include:

- Collection and preservation on microfilm of information on a total of 5,000 manufacturers and their products for instant referral by procurement personnel.
- Construction and exhibition of display boards containing samples of hundreds of items of the various categories managed by the center which, also, can be referred to by employees for aid in identification of an item. These are also used by suppliers to acquaint themselves with representative DCSC-interest items.
- Continuous educational training courses conducted for DCSC personnel to improve procurement techniques and simplify procedures. The courses are conducted by industrial representatives and experts in procurement fields.

In order to keep pace with the demand for faster and more efficient processing of requisitions and speedier delivery of needed materials to the action areas, DCSC has developed and uses a large and modern computer complex. Detailed computer programs have been developed and expanded into systems which process supply requests from receipt until ultimate shipment, with a minimum of human handling.

The center has been designated as the pilot DSA center for testing and putting into use a standard Inventory Control Point system, known in DSA as the Standard Automated Materiel Management System (SAMMS). The ultimate system, however, will be the result of the combined efforts of all DSA centers and DSA headquarters, all having shared responsibilities for developing various segments of the overall system.

SAMMS became operational at DCSC in FY 1970. It is an effort to achieve uniformity in materiel management functions among the logistics elements of DSA, and perhaps ultimately throughout DOD. Success of this system will establish a means of

DCSC Activities Between FY 1966 and FY 1969

(In millions)

	FY 1966	FY 1967	FY 1968	FY 1969
Value of Inventory (in millions)	$218.0	$405.5	$485.9	$521.6
Customer Demands	2.7	3.3	3.5	4.0
Net Sales	$244.7	$517.9	$457.5	$380.2
Value of Stock Fund Procurement (For items under Cognizance of DCSC)	$574.9	$490.3	$372.8	$336.8
Overall Value of Procurement (Including Military Interdepartmental Purchase Requests from the Services)	$697.1	$670.3	$608.2	$555.4

Figure 1.

DEFENSE CONSTRUCTION SUPPLY CENTER

COLUMBUS, OHIO 43215

PHONE (614) 236 PLUS EXTENSION
(INFORMATION (614) 236-3131)

EXECUTIVE OFFICER

F M Cecil, Lt Col USAF	2168

COMMANDER

E M TALLY JR, MAJOR GENERAL, USAF	2166

DEPUTY COMMANDER

J H FORD JR, COLONEL USA	2167

PERSONAL STAFF

PUBLIC AFFAIRS OFFICE R C Guthrie	2328
SMALL BUSINESS SPECIALIST C Peterson	3541

OFFICE OF COUNSEL

Counsel, D P Newton	3284
PROCUREMENT AND PRODUCTION COUNSEL Chief, K R Ellenberger	3284
LITIGATION COUNSEL Chief, J C Hubbard	3284

OFFICE OF PLANNING & MANAGEMENT

Director, D J Clements Jr, Capt SC USN	3241
Deputy Director, J L Kilkenny	3242
PLANS, PROGRAMS AND ANALYSIS DIVISION Chief, R O Hollman, Lt Col USAF	3276
MANAGEMENT CONTROL DIVISION Chief, F H Whitchurch, Cdr USN	2207
SYSTEMS AND PROCEDURES DIVISION Chief, L Black	2249

OFFICE OF DATA SYSTEMS

Director, A R Edsall, Jr, Capt SC USN	2141
Deputy Director, R A Paxton	2141
MANAGEMENT SUPPORT OFFICE Actg Chief, C W Schneider	2474
SYSTEMS DESIGN AND PROGRAMMING DIVISION Chief, H R Levin, CDR SC USN	3916
OPERATIONS DIVISION Chief, R P Davis	2526

OFFICE OF COMPTROLLER

Comptroller, M Flora	3151
Deputy Comptroller, L R Lagasse Maj USA	3151
BUDGET DIVISION Chief, J C Bennett	3129
ACCOUNTING & FINANCE DIVISION Chief, R A Young	3161
PERFORMANCE ANALYSIS & REPORTS DIVISION Chief, D C Carlman	3526

DIRECTORATE OF SUPPLY OPERATIONS

Director, R W Smith, Col USAF	3121
Deputy Director, H E Davis	3121
MANAGEMENT SUPPORT OFFICE Chief, P R Daugherty, Lt Col USA	2220
STOCK CONTROL DIVISION Chief, H T Ross, CDR USN	3840
REPAIR PARTS DIVISION Chief, V F Williams Jr, Lt Col USA	2189
CONSTRUCTION DIVISION Chief, C F Wilson, Lt Col USA	3171

DIRECTORATE OF PROCUREMENT & PRODUCTION

Director, D C Stafford, Capt SC USN	2191
Deputy Director, D J Fisher	2193
CONTRACT REVIEW OFFICE Actg Chief, G J Stergar, Maj USAF	2063
MANAGEMENT SUPPORT OFFICE Chief, V E Jones, Lt Col USMC	2920
OPERATIONS SUPPORT OFFICE Chief, S J Crognale, Jr, Lt SC USN	3543
PRODUCTION DIVISION Chief, R G Wiggers, Lt Col USA	2211
PROCUREMENT DIVISION I - CONSTRUCTION Chief, D E Lovell, Cdr SC USN	2281
PROCUREMENT DIVISION II - VEHICLE Chief, J R Witt, Lt Col USA	2106
SPECIAL PURCHASE (SPUR) DIVISION Chief, C J Stowell, Jr, Maj USAF	3246

DIRECTORATE OF TECHNICAL OPERATIONS

Director, R E Banning, Col USAF	3251
Deputy Director, W R Earnest	3251
MANAGEMENT SUPPORT OFFICE Chief, J W Nail, Maj USAF	2934
STANDARDIZATION OFFICE Chief, W Schuhart	3965
PROVISIONING COORDINATION OFFICE Chief, B W Armstrong	2231
CATALOGING DIVISION Chief, N Lessem	2241
QUALITY ASSURANCE DIVISION Chief, C W Fjelsted	3527
TECHNICAL SERVICES DIVISION Chief, R O Miller, Lt Col USAF	2203
TECHNICAL DATA DIVISION Chief, J B Dollison	2202

WOOD PRODUCTS OFFICE (DCSC)

Portland, Oregon 97208
Telephone: (503) 777-4441

Chief, J E Peters, Jr.	288
CONTRACT REVIEW AND PROCEDURES OFFICE Chief, F C Klopien	395
TECHNICAL SUPPORT DIVISION Chief, K T Lehmann	395
OPERATIONS SUPPORT DIVISION Chief, E G Cannard	301
PROCUREMENT OPERATIONS DIVISION Chief, (Vacant)	298

Chief, Purchase Branch C
G H Hammond

Wood Products Purchasing Office
Atlanta, Georgia 30303

Telephone: (404) 526-6644

DIRECTORATE OF INSTALLATION SERVICES

Director, W A Kerr, Col USMC	3101
Deputy Director, C C Rau	3101
OFFICE OF SAFETY AND INDUSTRIAL HEALTH Chief, C C Rau	3101
OPERATING MATERIEL DIVISION Chief, S Fields, LCdr USN	2304
ENGINEER DIVISION Chief, R M Simpson Maj USA	2102
SECURITY DIVISION Chief, R S Dodge, LCdr USN	3141
PROPERTY DISPOSAL DIVISION Chief, W H Bryan	2316
TELECOMMUNICATIONS DIVISION Chief, (Vacant)	2233

DIRECTORATE OF STORAGE & TRANSPORTATION

Director, K A Young, Col USAF	2251
Deputy Director, M R Greuel	2417
MANAGEMENT SUPPORT OFFICE Chief, R T Durkee, Lt Col USAF	3114
OPERATIONS CONTROL OFFICE Chief, J E Hammond, Cdr SC USN	3615
TRANSPORTATION AND TRAFFIC MANAGEMENT OFFICE Chief, J W Wallace, Lt Col USA	3281
RECEIVING DIVISION Chief, M W Raymond	2733
WAREHOUSING DIVISION Chief, R E Bagley, Lt Col USA	3215
SHIPPING DIVISION Chief, H T Flint	3297

DIRECTORATE OF IPE OPERATIONS

Director, R E Benson, Lt Col USMC	3165
Deputy Director, D Butt	3165
OPERATIONS & PRODUCTION CONTROL OFFICE Chief, R Tiebout	3729
TECHNICAL & QUALITY CONTROL OFFICE Chief, C Burnett	3737
INDUSTRIAL PLANT EQUIPMENT STORAGE DIVISION Chief, (Vacant)	3576
REPAIR/OVERHAUL DIVISION Chief, C Burke	3803

Editor's Note: Organization charts appearing in the Bulletin are edited by the editorial staff to reflect those elements of the various DoD organizations which are of interest to industry representatives. Organizational elements not involved in the DoD-industry relationship have been eliminated because of space limitation.

The information on personnel and telephone numbers is as current as is possible to obtain at the time we go to press.

supply effectiveness far above anything developed thus far in the logistics field.

The "Other Hat"

In addition to its primary mission of providing effective and economical supply support to the Military Services, DCSC also is one of seven principal storage depots in the DSA integrated warehouse and distribution system. The center's storage mission is similar to a commercial warehouse operation. Large tonnages of stocks are received, stored and issued for many different owners such as the other DSA centers, Defense Industrial Plant Equipment Center, the Army, Office of Civil Defense, and General Services Administration.

During FY 1969, the DCSC Directorate of Storage and Transportation (depot organization) received 302,674 line items and shipped 2,225,493 line items. At the present time, approximately 427,000 different line items, representing approximately 198,000 tons of materiel, are stored at DCSC. These items range from small gaskets and common hardware to huge items of government-owned industrial plant equipment, such as hydraulic presses.

Unique materiels which are stored include strategic and critical materiel for the General Services Administration, such as bulk metals, and civil defense material, such as shelter supplies consisting of survival-type food, medical and sanitation kits, and water storage containers to support shelters in West Virginia, Ohio and Western Pennsylvania.

During FY 1968, DCSC, again as the pilot DSA depot, began operation of a standard computer system for mechanizing receipt processing, shipment planning, freight consolidation, shipment status, stock locator files, workload forecasting, and the preparation and control of shipment documentation.

This system permits remote inquiry (from units located in the warehouses) of the central computer located in the center's Office of Data Systems. The remote devices are used to query the main computer for "put-away" locations for items and locator data for stored items, and to process requests for additional shipping workload (which has been retained/stored in the computer).

Considerable use is made of direct access (disk packs) units to permit random file processing, as contrasted to sequential processing in a magnetic tape system. This sytem, known as the Mechanization of Warehousing and Shipment Processing (MOWASP), has been placed into operation at all DSA depots.

In addition to MOWASP, DCSC has completed the installation of a new mechanized materials handling system in the Directorate of Storage and Transportation. This highly automated system permits the unloading, processing, and moving into storage or to shipping readiness a maximum of 2,950 packages in an 8-hour period, by mechanical means (conveyors and sorting devices) with a minimum of manual handling.

Other Missions

Other DCSC basic missions include performing maintenance for industrial plant equipment, civil defense engineer-type equipment and DSA mission items, and property disposal functions for some 146 satellite activities. Industrial plant equipment (IPE) consists of the machine tools and other mechanical or electrical equipment normally used by defense manufacturing plants and military maintenance shops for heavy equipment. IPE repair and rebuild work performed by DCSC involves precision and technical operations requiring close tolerances in machining and fitting. This equipment is first operationally tested or inspected and then repaired or rebuilt, as directed by the Defense Industrial Plant Equipment Center (DIPEC) at Memphis.

During FY 1969, maintenance was performed on approximately 800 IPE items. Repaired or rebuilt items are shipped to customers.

Maintenance performed on civil defense engineer-type equipment (such as portable generators, water pumps, water purification units and related accessories) and DSA mission stocks (reparable items stored at DCSC) is basically minor repair or modifications, required prior to issuing the items to the customers.

During FY 1969, a total of 91,211 line items of excess, surplus, scrap and waste materiel, representing 15,078 short tons with an acquisition value of $60,953,518, were received by DCSC. In this same period, a total of 72,682 line items, representing 15,146 short tons with an acquisition value of $58,280,911, were disposed of. The statistics cited represent the total activity for DCSC and satellited activities.

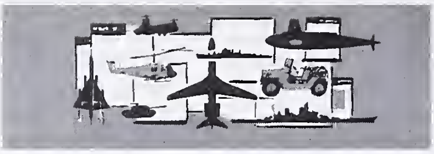
Determining Future Needs

The primary problem that we face in the future is to improve our forecasting capabilities so that we can provide our military customers the items they need, when they are needed, without building up great quantities of unusable inventories. Anyone can provide adequate support to the customer if he buys great quantities of each and every item that could ever possibly be required. This certainly is not an effective or efficient method and would waste many billions of dollars.

The normal method, used at DCSC to compute requirements, is based on an issue rate—use of past history to determine future needs. This method is supplemented by obtaining forecasts from our customers on high-dollar item needs, and by using good common sense to increase or decrease buy programs when the needs of our customers are escalating or de-escalating.

We can improve our forecasting by a more definitive categorization of our issues into the reasons for which the items were required. In determining future requirements, significant factors to be considered are whether or not issues were made to satisfy our customer's normal consumption, to fill a pipeline, or for a one-time project which will not be repetitive. We must increase our knowledge of the assets that are in the hands of our customers and the expected rate of consumption, to accurately pinpoint the customer's needs, both in quantity and timeliness.

Although we have taken some steps to achieve this goal, a program now under study will provide us more asset and consumption knowledge from our customers, so that we can provide a more efficient and responsive logistics system for less cost to the taxpayer.



DEFENSE PROCUREMENT

Contracts of $1,000,000 and over awarded during the month of January 1970:

DEFENSE SUPPLY AGENCY

5—**Sportwelt Shoe Co.**, Nashua, N.H. $1,338,904. 200,000 pair of men's black oxford dress shoes. Houlton, Me., and Nashua. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–70–C–1250.

7—**Burlington Industries, Inc.**, New York, N.Y. $1,709,488. 954,000 linear yards of green tropical wool and polyester cloth (USMC shade 2235, type III mothproofed). Raeford, N.C., and Clarksville, Va. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–70–C–1231.

9—**Vi-Mil, Inc.**, Cambridge, Mass. $1,280,563. 56,686 men's Marine Corps green wool serge overcoats. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–70–C–1011.

12—**Allis Chalmers Manufacturing Co.**, Milwaukee, Wis. $1,034,884. Electric forklift trucks. Harvey, Ill. Defense General Supply Center, Richmond, Va. DSA 400–70–C–3377.

19—**J. P. Stevens and Co., Inc.**, New York, N.Y. $1,787,520. 532,000 yards of Marine Corps green wool serge cloth. Rockingham, N.C., and Greer and Wallace, S.C. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–70–C–1297.

—**Burlington Industries, Inc.**, New York, N.Y. $1,003,500. 300,000 yards of Marine Corps green wool serge cloth. Raeford, N.C., and Clarksville, Va. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–70–C–1296.

20—**Altama Delta Corp.**, Darien, Ga. $1,689,548. 186,882 pairs of leather combat boots. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–70–C–1076.

—**McRae Industries, Inc.**, Mount Gilead, N.C. $1,368,445. 159,926 pairs of leather combat boots. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–70–C–1362.

CONTRACT LEGEND

Contract information is listed in the following sequence: Date—Company — Value — Material or Work to be Performed—Location of Work Performed (if other than company plant) — Contracting Agency—Contract Number.

22—**Otis Elevator Co.**, Cleveland, Ohio. $2,448,630. Forklift trucks. Defense General Supply Center, Richmond, Va. DSA 400–70–C–3557.

—**Valley Metallurgical Co., Inc.**, Essex, Conn. $1,212,312. Magnesium powder. Defense General Supply Center, Richmond, Va. DSA 400–70–C–3564.

26—**Allis Chalmers Manufacturing Co.**, Milwaukee, Wis. $2,415,650. 388 forklift trucks, 6,000 pound capacity. Defense General Supply Center, Richmond, Va. DSA 400–70–C–3593.

27—The Defense Personnel Support Center, Philadelphia, Pa., awarded the following contracts for wind resistant cotton and nylon sateen cloth:

Putnam Mills Corp., New York, N.Y. $1,230,000. 1,000,000 linear yards. Greenville, S.C., and Memphis, Tenn. DSA 100–70–C–1383.

J. P. Stevens and Co., Inc., New York, N.Y. $1,749,119. 1,508,000 linear yards. Piedmont and Wallace, S.C. DSA 100–70–C–1382.

30—**Burlington Industries**, Cleveland, Tenn. $1,283,202. 188,154 wool blankets for the Republic of Korea. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–70–C–1409.

DEPARTMENT OF THE ARMY

2—**Scovill Mfg. Co.**, Waterbury, Conn. $1,308,852. M219E1 grenade fuzes. Army Ammunition Procurement and Supply Agency, Joliet, Ill. DA–AA09–70–C0028.

—**Bowen-McLaughlin-York Co.**, York, Pa. $17,395,445. M–110 self-propelled, full track 8-inch howitzers; M–107 self-propelled, full track 177mm guns; and M–572 recovery vehicles. Army Weapons Command, Rock Island, Ill. DA–AF03–70–C0044.

—**Philco-Ford Corps.**, Philadelphia, Pa. $2,500,000 (contract modification). Design and control of spare parts of classified equipment. Army Electronics Command, Ft. Monmouth, N.J. (Contract No. not available.)

—**Allied Materials & Equipment Co.**, Kansas City, Kan. $2,651,940. Cylinder assemblies for M60 tank engines. Kansas City and Wichita, Kan. Army Tank Automotive Command, Warren, Mich. DA–AE07–70–C–2536.

—**Goodyear Tire & Rubber Co.**, Akron, Ohio. $1,072,710. Pneumatic tires for half-ton trucks. Tank Automotive Command, Warren, Mich. DA–AE07–70–C2461.

5—**Northwest Marine Ironworks Co.**, Portland, Ore. $1,498,975. Repairs to Engineer Corps seagoing hopper dredge. Engineer District, Portland, Ore. DA–CW57–70–C0040.

—**AVCO Corp.**, Richmond, Ind. $1,344,600 (contract modification). M–423 rocket fuze metal parts. Army Ammunition Procurement and Supply Agency, Joliet, Ill. DA–AA09–70–C0107.

6—**Appalachian Power Co.**, N.Y., N.Y. $3,597,750. Operation of power plant to support production requirements at Radford (Va.) Army Ammunition Plant. Army Ammunition Procurement and Supply Agency, Joliet, Ill. DA–11–173–AMC–134 (A).

8—**General Motors Corp.**, Indianapolis, Ind. $1,498,302. CD850–6A transmissions for the M60 tank. Army Tank Automotive Command, Warren, Mich. DA–AE07–70–C–1219.

—**Jenkins Construction Co., Inc.**, Silver Spring, Md. $1,621,500. Construction of a 500-man enlisted men's barracks building, Fort Meade, Md. Army Engineer District, Baltimore, Md. DA–CA31–70–C–0022.

9—**AVCO Corp.**, Charleston, S.C. $1,800,000. Overhaul and/or repair of T–53–13/13A helicopter engines. Army Aviation Systems Command, St. Louis, Mo. DA–AJ01–69–A–0308.

—**Martin K. Eby Construction Co.**, Wichita, Kan. $1,841,343. Construction of the South Topeka Levee, Kansas River-Topeka Project. Army Engineer District, Kansas City, Mo. DA–CW41–70–C–0041.

12—**Emco Porcelain Enamel Co., Inc.**, Port Chester, N.Y. $2,214,675. Metal ammunition boxes. Frankford Arsenal, Philadelphia, Pa. DA–AA25–70–C–0385.

13—**Aerojet General Corp.**, Azusa, Calif. $1,240,000 (contract modification). Modification of forward-looking, infrared airborne target acquisition and fire control systems. Frankford Arsenal, Philadelphia, Pa. DA–AA25–67–C–0471.

—**Stanford Research Institute**, Menlo Park, Calif. $1,119,418. Research and scientific studies in air defense and ballistic missile defense. Arlington, Va., and Menlo Park. Army Research Office, Arlington, Va.

14—**AVCO Corp.**, Stratford, Conn. $1,786,440. CY 1970 program for the T–53 turbine engine. Army Aviation Systems Command, St. Louis, Mo. DA–AJ01–70–C–0513.

—**Union Carbide Corp.**, New York, N.Y. $1,172,664. Reserve power supplies for M514-A1E1 fuzes. Bennington, Vt. Harry Diamond Laboratories, Washington, D.C. DA–AG39–70–C–0026.

15—**Chamberlain Manufacturing Corp.**, New Bedford, Mass. $9,502,720 (contract modification). Metal parts for 155mm projectiles. Army Ammunition Procurement and Supply Agency, Joliet, Ill. DA–AA09–70–C–0075.

—**Kings Point Manufacturing Co.**, Fayetteville, N.C. $1,611,115. Clipped 5.56mm ammunition bandoliers. Frankford Arsenal, Philadelphia, Pa. DA–AA25–70–C–0370.

—**Chrysler Corp.**, Sterling Heights, Mich. $1,529,630. 20mm weapon system conversion kits for the M114A1 reconnaissance vehicle. Army Weapons Command, Rock Island Arsenal, Ill. DA–AF03–70–C–0048.

—The Army Aviation Systems Command, St. Louis, Mo., awarded the following contracts for maintenance support, modification, and crash/battle damage repair of aircraft, fixed and rotary winged, in South Vietnam:

Dynalectron Corp., Fort Worth, Tex. $9,532,071. DA–23–204–AMC–04022(T).

Lear Siegler, Inc., Oklahoma City, Okla. $8,223,799. DA–23–204–AMC–04023(T).

Lockheed Aircraft Corp., Midwest City, Okla. $2,416,370. DA–23–204–AMC–04024(T).

16—**General Motors Corp.**, Detroit, Mich. $3,344,975. 1¼ ton cargo trucks and ambulances. Warren, Mich., and Baltimore, Md. Army Tank Automotive Command, Warren, Mich. DA–AE07–69–C–0071.

—**Olin Corp.**, East Alton, Ill. $2,431,800 (contract modification). 5.52mm ball cartridges. Frankford Arsenal, Philadelphia, Pa. DA–AA25–70–C–0162.

—**Ralph M. Parsons Co.**, Los Angeles, Calif. $1,783,128 (contract modification). Standard design radar site and site adaption of the design to the first Safeguard location, Grand Forks, N.D. Army Corps of Engineers, Huntsville, Ala. DA–CA87–68–C–0001.

—**Ridge Instrument Co., Inc.**, Huntsville, Ala. $1,657,322. General calibration sets for test equipment. Army Missile Command, Redstone Arsenal, Huntsville, Ala. DA–AH01–70–C–0655.

—**Federal Laboratories, Inc.**, Saltsburg, Pa. $1,181,537. Riot control hand grenades. Edgewood Arsenal, Md. DA–15–70–C–0206.

19—**Device and Components Co.**, Santa Ana, Calif. $3,154,752. Support packing for 105M1 artillery shells. Army Ammunition Procurement and Supply Agency, Joliet, Ill. DA–AA09–70–C–0257.

20—**Control Data Corp.**, Minneapolis, Minn. $1,091,136. Data processing feasibility study. Safeguard System Command, Huntsville, Ala. DA–HC60–70–C–0053.

22—**Northrop Corp.**, Anaheim, Calif. $1,533,652. Flechette warheads, WDU–4A/A. Army Ammunition Procurement and Supply Agency, Joliet, Ill. DA–AA09–70–C–0132.

—**Action Manufacturing Co.**, Philadelphia, Pa. $1,043,756. Metal parts for M524 point detonating fuzes. Army Procurement Agency, Chicago, Ill. DA–AA09–70–C–0101.

23—**Pace Corp.**, Memphis, Tenn. $2,286,260 (contract modification). Trip flares. Russel and Camden, Ark., and Memphis. Picatinny Arsenal, Dover, N.J. DA–AA21–70–C–0137.

—**Chrysler Motor Corp.**, Warren, Mich. $1,472,932. One-ton cargo trucks and ambulances. Army Tank Automotive Command, Warren, Mich. DA–AE07–70–C–0106.

—**Bowen-McLaughlin-York**, York, Pa. $1,313,784. 2½- and 5-ton truck armor plates. Army Tank Automotive Command, Warren, Mich. DA–AE07–70–C–3215.

—**Galion-Amco, Inc.**, Galion, Ohio. $1,257,051 (contract modification). Metal parts assembly for point detonating fuzes. Frankford Arsenal, Philadelphia, Pa. DA–AA25–70–C–0329.

—The Army Ammunition Procurement and Supply Agency, Joliet, Ill., issued the following contracts:

Olin Corp., East Alton, Ill. $4,744,041 (contract modification). Load assemblies for 81mm projectiles. DA–AA09–70–C–0108.

Olin Corp., East Alton, Ill. $1,189,338. Time fuzes for 81mm projectiles. Marion, Ill. DA–AA09–70–C–0162.

Heckethorn Manufacturing Co., Dyersburg, Tenn. $2,185,307. Metal parts for 40mm projectiles. DA–AA09–70–C–0262.

Bell and Howell Co., Chicago, Ill. $1,315,378 (contract modification). Metal parts for time fuzes. DA–AA09–70–C–0067.

Eastern Tool and Manufacturing Co., Belleville, N.J. $1,253,700. Metal parts for 40mm projectiles. DA–AA09–70–C–0261.

26—**General Energy Systems Corp., Cenco Div.**, Janesville, Wis. $9,340,000. Construction of buildings, including utilities, installation of mechanical equipment and support facilities to complete work for five TNT lines. Army Ammuniton Plant, Newport, Ind. Army Engineer District, Chicago, Ill. DA–CA23–70–C–0035.

—**Chamberlain Manufacturing Co.**, Waterloo, Iowa. $1,002,240. Metal parts for smoke warheads, M156. Army Ammunition Procurement and Supply Agency, Joliet, Ill. DA–AA09–70–C–0109.

27—**Wire and Metal Specialties Corp.**, Warren, Pa. $1,645,200. 5.56mm clip cartridges for M–16 rifles. Frankford Arsenal, Philadelphia, Pa. DA–AA25–70–C–0417.

—**Associated Spring Corp.**, Bristol, Conn. $1,506,700. 5.56mm cartridge clips for M–16 rifles. Frankford Arsenal, Philadelphia, Pa. DA–AA25–70–C–0418.

—**Teledyne Industries, Inc.**, Muskegon, Mich. $1,327,950. Cylinder assemblies for M48 tank engines. Army Tank Automotive Command, Warren, Mich. DA–AE07–70–C–3019.

—**Marathon Battery Co.**, St. Paul, Minn. $1,003,500. BA–43861/PRC–25 dry batteries, engineering samples and high and low temperature testing equipment. Procurement Division, Army Electronics Command, Philadelphia, Pa. DA–AB05–70–C–1384.

—**Bell Aerospace Corp.**, Fort Worth, Tex. $1,336,440. Aircraft heater kits. Hurst, Tex. Army Aviation Systems Command, St. Louis, Mo. DA–AJ01–69–A–0314.

28—**Allis Chalmers Manufacturing Co.**, York, Pa. $4,472,960. Manufacture and installation of three generators for the Dworshak Dam and Reservoir Project, Clear Water County, Idaho. Army Engineer District, Walla Walla, Wash. DA–CW68–70–C–0057.

—**Levinson Steel Co.**, Pittsburgh, Pa. $4,372,010. Metal parts for 105mm high explosive projectiles, M–1. Hays Army Ammunition Plant, Pittsburgh. Army Ammunition Procurement and Supply Agency, Joliet, Ill. DA–AA09–69–C–0023.

—**Honeywell, Inc.**, Hopkins, Minn. $1,348,593 (contract modification). Fuzes (M219-E1). DA–AA09–70–C–0027. $3,852,074. XM224 bomb fuzes. DA–AA09–70–C–0012. Army Ammunition Procurement and Supply Agency, Joliet, Ill.

—**Pace Corp.**, Memphis, Tenn. $2,358,417. Ground illuminating parachute signals (M127A1). Camden, Ark., and Memphis. Picatinny Arsenal, Dover, N.J. DA–AA21–70–C–0381.

—**Chrysler Outboard Corp.**, Hartford, Wis. $7,435,993. Military standard engines, 1½, 3 and 6 hp. Army Mobility Equipment Command, St. Louis, Mo. DA–AK01–69–C–3413.

—**Resdel Engineering Corp.**, Arcadia, Calif. $3,718,325. Electronic components for use in a classified system. Procurement Division, Army Electronics Command, Fort Monmouth, N.J. DA–AB07–70–C–0128.

29—**Uniroyal, Inc.**, New York, N.Y. $13,684,011 (contract modification). Support services and explosives production, Army Ammunition Plant, Joliet, Ill. Army Ammunition Procurement and Supply Agency, Joliet, Ill. DA–11–173–AMC–00062(A).

—**Olin Mathieson Chemical Corp.**, East Alton, Ill. $6,558,795 (contract modification). M6, M1, M3A1, M90A1 and M67 propellant, and loading, assembling and packing propellant charge assemblies. Charlestown, Ind. Army Ammunition Procurement and Supply Agency, Joliet, Ill. DA–AA09–69–C–0148.

—**Hamilton Watch Co.**, Lancaster, Pa. $6,097,000. AN/PRC–77 radio sets and receiver transmitters, RT841/PRC–77. Army Electronics Command, Philadelphia, Pa. DA–AB05–70–C–4412.

—**Bulova Watch Co., Inc.**, Valley Stream, N.Y. $2,612,539. Metal parts for fuzes, M524A5, for 81mm high explosives. Army Procurement Agency, Chicago, Ill. DA–AA09–70–C–0100.

—**Gulf Western Industries, Inc.**, Orlando, Fla. $5,041,311. Metal parts for point detonating fuzes, M551. Army Procurement Agency, Chicago, Ill. DA–AA09–70–C–0103.

—**Olin Corp.**, New Haven, Conn., $2,475,900. 5.56mm ball cartridges, M193. Frankford Arsenal, Philadelphia, Pa. DA–AA25–70–C–0344.

—**IBM Corp.**, Gaithersburg, Md. $1,349,627. Preliminary ballistic missile defense software development program. Safeguard Systems Command, Huntsville, Ala. DA–HC60–70–C–0052.

30—**Fairchild Camera and Instrument Corp.**, Copiague, N.Y. $2,547,000. Artillery proximity fuzes, M514A1E1. Harry Diamond Laboratories, Washington, D.C. DA–AG39–70–C–0027.

—**Hamilton Watch Co.**, Lancaster, Pa. $6,424,080. Mk 15 Mod 0 rear-fitting safety devices for artillery fuzes. Harry Diamond Laboratories, Washington, D.C. DA–AG39–70–C–0032.

—**Eastman Kodak Co.**, Rochester, N.Y. $1,996,440. Rear-fitting safety devices for artillery fuzes. Harry Diamond Laboratories, Washington, D.C. DA–AG39–70–C–0033.

—**Gentex Corp.**, Carbondale, Pa. $1,650,144 (contract modification). Pilot's protective helmets. Army Procurement Agency, New York, N.Y. DA–AG25–69–C–0881.

—**Great Lakes Dredge and Dock Co.**, New Orleans, La. $2,524,400. Dredging of shoal material from the Mississippi River gulf outlet channel. Plaquemines Parish, La. Army Engineer District, New Orleans, La. DA–CW29–70–C–0136.

—**Western Electric Co., Inc.**, New York, N.Y. $1,295,319 (contract modification). FY 1970 task and skill analysis for Safeguard training. Safeguard Systems Command, Huntsville, Ala. DA–HC60–69–C–0010.

—**Bell Aerospace Corp.**, Fort Worth, Tex. $5,000,000. AH–1G helicopters. Hurst, Tex. Army Aviation Systems Command, St. Louis, Mo. DA–AJ01–70–C–0235.

—**Kaiser Jeep Corp.**, Toledo, Ohio. $2,010,914. 5-ton trucks, XM809 series. South Bend, Ind. Army Tank Automotive Command, Warren, Mich. DA–AE06–69–C–0009.

—The Army Procurement and Supply Agency, Joliet, Ill., issued the following contracts:

Airport Machining Corp., Martin, Tenn. $1,188,000 (contract modification). High explosive projectiles, M49A3. DA–AA09–70–C–0079.

Federal Cartridge Corp., Minneapolis, Minn. $53,219,044 (contract modification). Operation of Twin Cities Army Ammunition Plant, New Brighton, Minn., and related support services. DA–36–038–AMC–01099(A).

Harvey Aluminum Sales, Inc., Torrance, Calif. $38,902,367 (contract modification). Loading, assembling and packing medium caliber ammunition and related components, and for support services and operation of the Army Ammunition Plant, Milan, Tenn. DA–11–173–AMC–00520(A).

Day and Zimmerman, Inc., Philadelphia, Pa. $25,271,159. Tracers, detonators and boosters, Lone Star Ammunition Plant, Texarkana, Tex. DA–11–173–AMC–00114 (A).

General Motors Corp., Indianapolis, Ind. $1,367,100 (contract modification). 81mm projectiles, M374/A1. Cleveland, Ohio. DA–AA09–70–C–0058.

Flinchbaugh Products, Inc., Red Lion, Pa. $6,397,578. Metal parts for 105mm projectiles. DA–AA09–70–C–0272.

Westclox Div., General Time Corp., LaSalle, Ill. $1,501,000 (contract modification). MSTQ fuzes, M564. Peru, Ill. DA–AA09–70–C–0216.

Donovan Construction Co., New Brighton, Minn. $9,404,320. Metal parts for 155mm high explosive projectiles, M107. Twin Cities Army Ammunition Plant. DA–AA09–70–C–0085.

—**Raytheon Co.**, Andover, Mass. $4,449,903 (contract modification). Engineering services for the improved Hawk missile system. Bedford and Andover, Mass., and White Sands Missile Range, N.M. DA–AH01–70–C–0195. $1,322,368. Battery sets for retrofit of basic Hawk missile equipment. Fort Bliss, Tex., and Andover. DA–AH01–70–C–0615. Army Missile Command, Huntsville, Ala.

—**Raytheon Co.**, Bristol, Tenn. $2,448,900. Artillery proximity fuzes, M514A1E1. Harry Diamond Laboratories, Washington, D.C. DA–AG39–70–C–0028.

DEPARTMENT OF THE NAVY

5—**Singer-General Precison, Inc.**, Binghamton, N.Y. $9,966,875. F–4J weapon system trainers with support items to train pilots. Binghamton and Sunnyvale, Calif. Naval Training Device Center, Orlando, Fla. N61339–69–C–0174.

—**Lockheed Electronics Div., Lockheed Aircraft Corp.**, Plainfield, N.J. $7,193,569. Mark 86 computer-oriented gun fire control systems. Naval Ordnance Systems

Command, Washington, D.C. N00017–70–C–4204.

—**Grumman Aerospace Corp.**, Bethpage, N.Y. $6,000,000 (contract modification). Long lead time effort and material for FY 1970 procurement of EA-6B aircraft. Naval Air Systems Command, Washington, D.C. N00019–67–C–0078.

—**North American Rockwell Corp.**, Los Angeles, Calif. $4,352,885. CT-39E multi-engine aircraft. St. Louis, Mo., and Los Angeles. Naval Air Systems Command, Washington, D.C. N00019–70–C–0318.

—**Southern Stevedoring Corp.**, Norfolk, Va. $2,990,924. CY 1970 stevedoring services for Naval Supply Center, Norfolk. Naval Supply Center, Norfolk, Va. N00189–69–D–0238.

—**Singer-General Precison, Inc.**, Little Falls, N.J. $2,508,800. Test equipment for production of ASN-84 navigation systems for P-3C aircraft. Navy Aviation Supply Office, Philadelphia, Pa. N00383–68–A–3201–0232.

—**Systems Consultants, Inc.**, Washington, D.C. $1,054,198. Studies to formulate test plans and procedure systems for classified electronic equipment. Naval Ship Systems Command, Washington, D.C. N00024–70–C–1129.

—**Meadowgold Dairies**, Honolulu, Hawaii. $1,099,131. Dairy products for the Navy. Naval Supply Center, Pearl Harbor, Hawaii. N00604–70–D–0227.

6—**Sanders Associtaes, Inc.**, Nashua, N.H. $5,000,000. Manufacture of electronic equipment. Naval Electronic Systems Command, Washington, D.C. N00039–70–C–2536.

9—**ESB Corp.**, Exide Power Systems, Inc., Philadelphia, Pa. $5,624,891. Submarine batteries, spare parts and repair equipment. Naval Ship Systems Command, Washington, D.C. N00024–70–C–5328.

—**Collins Radio Co.**, Cedar Rapids, Iowa. $3,084,000. Submarine emergency communication transmitters. Naval Electronics Systems Command, Washington, D.C. N00039–70–C–1504.

—**McDonnell Douglas Corp.**, St. Louis, Mo. $2,000,000 (contract modification). Long lead time effort and material for RF-4E mobile training set and support equipment for the Air Force. Naval Air Systems Command, Washington, D.C. N00019–68–C–0495.

13—**Systems Engineering Laboratories**, Fort Lauderdale, Fla. $1,184,943. Automatic data processing systems, Model 810A. Naval Research Laboratory, Washington, D.C. N00173–70–C–0431.

14—The Naval Air Systems Command, Washington, D.C., awarded the following contract modifications:

Lockheed Aircraft Corp., Burbank, Calif. $10,830,623. Long lead time effort and material in support of FY 1970 P-3C aircraft procurement. N00019–69–C–0237.

United Aircraft Corp., East Hartford, Conn. $7,168,000. J-52-P-408 engines and spares for A-4M aircraft. N00019–67–C–0182.

McDonnell Douglas Corp., Long Beach, Calif. $5,247,000. Long lead time effort in support of FY 1970 TA-4J/A-4M aircraft procurement. N00019–67–C–0170.

Ryan Aeronautical Co., San Diego, Calif. $2,850,000. BQM-34E/F aerial target system for the Navy and Air Force. N00019–69–C–0693.

—**Lasko Metal Products, Inc.**, West Chester, Pa. $1,383,840. Missile shipping and storage containers. Naval Air Systems Command, Washington, D.C. N00019–70–C–0316.

15—**Grumman Aerospace Corp.**, Bethpage, N.Y. $110,621,807. F-14A weapon system. Naval Air Systems Command, Washington, D.C. N00019–69–C–0422.

16—The Naval Air Systems Command, Washington, D.C., awarded the following contract modifications:

Lockheed Aircraft Corp., Burbank, Calif. $40,000,000. S-3A weapon system. N00019–69–C–0385.

Grumman Aerospace Corp., Bethpage, N.Y. $20,000,000. E-2C aircraft. N00019–68–C–0542.

General Dynamics Corp., Pomona, Calif. $4,500,000. Standard ARM missiles for the Navy and Air Force. N00019–69–C–0336.

—**Vitro Corp. of America**, Silver Spring, Md. $11,974,600. Systems engineering and supporting services for the Surface Missile Systems Project Director. Naval Ordnance Systems Command, Washington, D.C. N00017–70–C–4417.

—**Pennsylvania State University**, University Park, Pa. $5,270,000. Research and development in naval weapons systems, and technical direction of the Mk 48 Mod 0 torpedo. Naval Ordnance Systems Command, Washington, D.C. N00017–70–C–1407.

—**International Telephone and Telegraph**, Paramus, N.J. $1,250,000. Programming services to develop, produce, deliver and maintain computer systems programs for the Fleet Computer Programming Center, Atlantic. Damneck-Virginia Beach, Va. Naval Purchasing Office, Washington, D.C. N00600–70–D–0541.

19—**North American Rockwell Corp.**, Columbus, Ohio. $11,875,200. T-2C aircraft and related supplies and services. Naval Air Systems Command, Washington, D.C. N00019–70–C–0144.

—**Raytheon Co.**, Portsmouth, R.I. $10,537,788. Submarine sonar, related equipment and engineering services. Naval Ship Systems Command, Washington, D.C. N00024–70–C–1170.

—**FMC Corp.**, Minneapolis, Minn. $7,915,416. 5 inch 54 caliber gun mounts, Mk 45 Mod 0. Naval Ordnance Systems Command, Washington, D.C. N00017–68–C–4211.

—**Sperry Rand Corp.**, Great Neck, N.Y. $6,382,002. Repair parts for Mk 3, Mods 6 and 7, Ships Inertial Navigation System (SINS). Ships Parts Control Center, Mechanicsburg, Pa. N000104–68–A–0009.

—**TRW, Inc.**, Washington, D.C. $6,157,984. Property and services to perform system analysis, integration analysis, engineering support, technical management support and engineering laboratory experimentation for the Anti-Submarine Warfare System Project. Naval Ordnance Systems Command, Washington, D.C. N00017–70–C–1409.

—**Sylvania Electric Products, Inc.**, Needham Heights, Mass. $4,684,000. Marine tactical data systems trainers, 15A19. Naval Training Device Center, Orlando, Fla. N61339–70–C–0105.

—**Kaman Aircraft Corp.**, Bloomfield, Conn. $4,438,147. Conversion of UH-2A/B helicopters to UH-2C configuration, including progressive aircraft rework. Naval Air Systems Command, Washington, D.C. N00019–70–C–0051.

—**General Electric Co.**, Cincinnati, Ohio. $3,897,013. Retrofit kits for J-79-GE10 aircraft engines. Naval Aviation Supply Office, Philadelphia, Pa. F34601–69–A–1029.

—**Sterling Laboratories**, Westlake Village, Calif. $1,499,511. AN/TXQ-3 radar data relay sets. Naval Electronic Systems Command, Washington, D.C. N00039–70–C–3527.

—**Sperry Rand Corp.**, Syosset, N.Y. $1,216,000. Engineering services for the technical assistance program, SSBN 598 USS George Washington-class fleet ballistic missile submarine second overhaul implementation. Naval Ship Systems Command, Washington, D.C. N00024–70–C–5340.

20—**Raytheon Co.**, Oxnard, Calif. $2,671,782. Inspect, service, repair and furnish necessary maintenance on F-4 aircraft weapon systems. Point Mugu, Calif., and Oxnard. Naval Purchasing Office, Los Angeles, Calif. N00123–70–C–0435.

—**Applied Physics Lab., University of Washington**, Seattle, Wash. $2,076,000. Continuation of research, development, operation and maintenance for torpedo exploders and targets, oceanography, transducers and electrochemical studies. Naval Ordnance Systems Command, Washington, D.C. NOw 65–0207–D.

21—**McDonnell Douglas Corp.**, St. Louis, Mo. $27,200,000 (contract modification). Long lead time effort and materials for F-4J, F-4E and RF-4E aircraft for the Navy and Air Force. Naval Air Systems Command, Washington, D.C. N00019–68–C–0495.

22—**Philco-Ford Communication and Technical Services**, Fort Washington, Pa. $1,876,557. Restoration and conversion of radar repeater equipment. Norfolk, Va. Naval Ship Systems Command, Washington, D.C. N00024–70–D–1204.

23—**Whittaker Corp.**, Saugus, Calif. $7,547,963. Aircraft parachute flares. Naval Ships Parts Control Center, Mechanicsburg, Pa. N00104–70–C–A071.

—**Raytheon Co.**, South Lowell, Mass. $3,902,800. Guidance and control groups for Sidewinder missiles. Naval Air Systems Command, Washington, D.C. N00019–70–C–0269.

—**Kilgore Corp.**, Toone, Tenn. $3,696,804. Aircraft parachute flares. Naval Ships Parts Control Center, Mechanicsburg, Pa. N00104–70–C–A070.

26—**University of Alaska**, College, Alaska. $1,341,700. Research on cold weather problems in the Arctic. Office of Naval Research, Washington, D.C.

—**LTV Aerospace Corp.**, Dallas, Tex. $1,000,000 (contract modification). Development of interface between A-7 aircraft avionics and Versatile Avionics Shop Test (VAST) systems. Naval Air Systems Command, Washington, D.C. N00019–69–C–0536.

29—**RCA**, Princeton, N.J. $5,111,281. Three Navy navigation satellites. Naval Strategic Systems Project Office, Washington, D.C. N00030–69–0213.

—**Raytheon Co.**, Sudbury, Mass. $2,135,000. Engineering support for Polaris and Poseidon guidance system electronic assemblies. Naval Strategic Systems Project Office, Washington, D.C. N00030–70–0128.

30—**United Aircraft Corp.**, Hartford, Conn. $20,400,000 (contract modification). FY 1970 procurement of TF-30-P-100 engines for the Air Force. Naval Air Systems Command, Washington, D.C. N00019–67–C–0332.

—**Dayton T. Brown, Inc.**, Bohemia, N.Y. $1,204,196. Preproduction lot sample testing of armament and survival equipment. Naval Air Systems Command, Washington, D.C. N00019–70–C–0329.

—**Campbell Machine, Inc.**, San Diego, Calif. $1,195,518. Regular overhaul of USS Cleveland, LPD 7. Supervisor of Shipbuilding, Conversion and Repair, 11th Naval District, San Diego, Calif. N62791–70–B–0407.

—**Ordnance Research Lab, Pennsylvania State University**, University Park, Pa. $1,670,000. Additional support for the Mk 48 torpedo program. Naval Ordnance Systems Command, Washington, D.C. N00017–70–C–1407.

—**Litton Systems, Inc.**, Van Nuys, Calif. $2,000,271. Air Operational Central, system, AN/TYZ-2. Hq., Marine Corps, Arlington, Va.

DEPARTMENT OF THE AIR FORCE

2—**Goodyear Aerospace Corp.**, Litchfield, Park, Ariz. $5,522,101. Components for radar equipment for reconnaissance aircraft. Aeronautical Systems Div., AFSC, Wright-Patterson AFB, Ohio. F33657–70–C–0170.

—**Westinghouse Electric Corp.**, Baltimore, Md. $15,000,000. Electronic countermeasure pods, spares, engineering services and data. Aeronautical Systems Div., AFSC, Wright-Patterson AFB, Ohio. F33657–70–C–0588.

—**Thiokol Chemical Corp.**, Bristol, Pa. $21,188,000. Production of Stage I motors for Minuteman III missiles. Brigham City, Utah. Space and Missile Systems Organization, AFSC, Los Angeles, Calif. F04701–69–C–0197.

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5—**Thiokol Chemical Corp.**, Bristol, Pa. $2,700,000 (contract modification). Long lead time hardware for FY 1971 production of Stage I Minuteman III motors. Brigham City, Utah. Space and Missile Systems Organization, AFSC, Los Angeles, Calif. F04701–69–C–0197.

—**McDonnell Douglas Corp.**, Long Beach, Calif. $1,200,000 (contract modification). Spare parts for bomb release units applicable to F–111 aircraft. Torrance, Calif. Warner Robins Air Materiel Area, AFLC Robins AFB, Ga. F33657–68–C–1247.

6—**General Electric Co.**, Cincinnati, Ohio. $42,694,040. Production of TF–39 turbofan aircraft engines. F33657–15003. $2,000,000. Improvement of component parts of J–79 aircraft engines. F33657–70–C–0063. Aeronautical Systems Div., AFSC, Wright-Patterson AFB, Ohio.

—**Lockheed Aircraft Corp.**, Sunnyvale, Calif. $2,455,270. Advanced data system for the satellite control facility. Air Force Satellite Control Facility, Los Angeles, Calif. F04695–67–C–0176.

—**Honeywell, Inc.**, St. Petersburg, Fla. $5,347,645. Gyro accelerometers. Space and Missile Systems Organization, AFSC, Los Angeles, Calif. F04701–69–C–0243.

8—**Fairchild Hiller Corp.**, St. Augustine, Fla. $1,740,895. Inspection, repair as necessary, and modification of C–130 aircraft. Warner Robins Air Materiel Area, AFLC, Robins AFB, Ga. F09603–70–C–1542.

9—**General Dynamics Corp.**, Fort Worth, Tex. $1,125,000. Spare parts for F–111 aircraft. Aeronautical Systems Division, AFSC, Wright-Patterson AFB, Ohio. AF33657–13403.

—**Lockheed-Georgia Co.**, Marietta, Ga. $100,000,000. Run A C–5A aircraft production. Aeronautical Systems Division, AFSC, Wright-Patterson AFB, Ohio. F33(657)–15033.

12—**Lockheed Aircraft Corp.**, Marietta, Ga. $11,278,070. C–5A aircraft spare parts. Detachment 31, San Antonio Air Materiel Area, AFLC, Marietta, Ga. AF33657–15053.

—**The Boeing Co.**, Seattle, Wash. $1,050,000. Study of the feasibility of a mobile capability for the Minuteman weapon system. Space and Missile Systems Organization, AFSC, Los Angeles, Calif. F04701–70–C–0139.

—**Philco-Ford Corp.**, Palo Alto, Calif. $1,005,013. Satellite control network. Hq., Air Force Space Control Facility, Los Angeles Air Force Station, Calif. F04701–68–C–0086.

13—**Radiation, Inc.**, Melbourne, Fla. $2,356,000. Development and production of airborne communication equipment. Palm Bay, Fla. Electronics Systems Division, AFSC, L.G. Hanscom Field, Mass. F19628–69–C–0159.

14—**Ryan Aeronautical Co.**, San Diego, Calif. $1,500,000. Design and develop target drone and related aeropace ground equipment. Aeronautical Systems Division, AFSC, Wright-Patterson AFB, Ohio. F33657–70–C–0305.

—**The Boeing Co.**, Wichita, Kan. $1,463,912. Maintenance of B-52 aircraft. Oklahoma City Air Materiel Area, AFLC, Tinker AFB, Okla. F34601–69–C–3987.

—**Hughes Aircraft Co.**, Culver City, Calif. $1,298,990. Electronic countermeasure equipment for the F–4E aircraft. Warner Robins Air Materiel Area, AFLC, Robins AFB, Ga. F04606–69–A–0229.

—**Fairchild Hiller Corp.**, Germantown, Md. $1,038,000. Design and development of electronic equipment for interpreting reconnaissance aircraft. Aeronautical Systems Division, AFSC, Wright-Patterson AFB, Ohio. F33657–69–C–1235.

15—**Bell Aerospace Corp.**, Buffalo, N.Y. $7,000,000. Post boost propulsion subsystem for Minuteman III. Space and Missile Systems Organization, AFSC, Los Angeles, Calif. F04701–69–C–0193.

—**Hughes Aircraft Co.**, Culver City, Calif. $1,484,160. Test equipment and related spare parts for the Falcon missile. Warner Robins Air Materiel Area, AFLC, Robins AFB, Ga. F09603–70–C–0265.

—**Lear-Sicgler, Inc.**, Santa Ana, Calif. $1,297,658. Air conditioning equipment and related spare parts for the F-104 aircraft. Sacramento Air Materiel Area, AFLC, McClellan AFB, Calif. F04606–70–C–0537.

16—**Cessna Aircraft Co.**, Wichita, Kan. $1,760,936. 0–2A aircraft, spare parts and related aerospace ground equipment. Aeronautical System Division, AFSC, Wright-Patterson AFB, Ohio. F33657–70–C–0218.

20—**Aerodex, Inc.**, Miami, Fla. $5,582,555. Overhaul of R–4360 series engines and component parts. San Antonio Air Materiel Area, AFLC, Kelly AFB, Tex. F41608–70–C–0900.

21—**North American Rockwell Corp.**, Los Angeles, Calif. $2,605,000. Reconditioning and modification of F–100A aircraft. Sacramento Air Materiel Area, AFLC, McClellan AFB, Calif. F04606–70–C–0604.

—**Massachusetts Institute of Technology**, Cambridge, Mass. $1,800,000. Basic research in the properties of matter in intense magnetic fields. Office of Scientific Research, Arlington, Va. F44620–67–C–0047.

—**Control Data Corp.**, Minneapolis, Minn. $1,000,000. Computer maintenance and support services. Sunnyvale and Santa Monica, Calif. Space and Missile Systems Organization, AFSC, Los Angeles, Calif. F04701–69–C–0362.

23—**The Boeing Co.**, Wichita, Kan. $1,631,126. Engineering services for the B–52 weapon system. Oklahoma Air Materiel Area, AFLC, Tinker AFB, Okla. F34601–70–C–0810.

26—**General Electric Co.**, Cincinnati, Ohio. $3,550,000. Engineering development of engines for F–14B and F–15 aircraft. Aeronautical Systems Division, AFSC, Wright-Patterson AFB, Ohio, F33657–69–C–0061.

27—**Lockheed Aircraft Corp.**, Marietta, Ga. $13,769,760. Spare parts for C–5A aircraft. Detachment 31, San Antonio Air Materiel Area, AFLC, Marietta, Ga. AF 33(657)–15053.

—**General Dynamics Corp.**, Fort Worth, Tex. $9,505,077. Aerospace ground equipment for F–111 aircraft. Aeronautical Systems Division, AFSC, Wright-Patterson AFB, Ohio. AF 33(657)–13403.

—**Curtiss-Wright Corp.**, Wood-Ridge, N.J. $1,890,131. Spare parts for J–65 aircraft engines. San Antonio Air Materiel Area, AFLC, Kelly AFB, Tex. F41608–69–A–0057.

—**General Electric Co.**, Burlington, Vt. $1,406,493. Ammunition storage drums used in aircraft gun systems. Armament Development Test Center, Eglin AFB, Fla. F08635–70–C–0205.

28—**McDonnell Douglas Corp.**, St. Louis, Mo. $1,191,400. Aerospace ground equipment and spare parts for F–4 aircraft. Robertson, Mo. Ogden Air Materiel Area, AFLC, Hill AFB, Utah. F34601–69–A–2245.

29—**Scope, Inc.**, Reston, Va. $2,200,000. Development of an electronic counter-measure system. Falls Church, Va. Aeronautical Systems Division, AFSC, Wright-Patterson AFB, Ohio. F33657–70–C–0709.

—**AVCO Corp.**, Everett, Mass. $1,093,796. Re-entry physics research. Space and Missile Systems Organization, AFSC, Los Angeles, Calif. F04701–70–C–0128.

30—**Curtiss-Wright Corp.**, Wood Ridge, N.J. $1,048,756. Spare parts for J–65 aircraft engines. San Antonio Air Materiel Area, AFLC, Kelly AFB, Tex. F41608–69–A–0057.

—**Williams Research Corp.**, Walled Lake, Mich. $1,447,200. Development of a small jet engine for decoy missiles. Aeronautical Systems Division, AFSC, Wright-Patterson AFB, Ohio. F33657–70–C–0570.

OFFSHORE

5—**Canadian Commercial Corp.**, Ottawa, Ont. $6,997,396 (contract modification). T400–CP–400 engines and special support equipment for Navy and Air Force. Quebec. Naval Air Systems Command, Washington, D.C. N00019–69–C–0125.

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TECOM Makes Organization Changes

The Army Test and Evaluation Command, Aberdeen Proving Ground, Md., has undergone organizational changes to improve its management and functional control.

Created under the change is the Test Systems Analysis Directorate (TSAD), headed by Colonel Vitaly Kovalesky, formerly director of infantry materiel.

The Plans and Operations Directorate, headed by Colonel Cornelius J. Molloy Jr., was redesignated the Test Operations Directorate, and its Methodology and Instrumentation Divisions were reassigned to TSAD.

Staff changes include: Brigadier General Michael Paulick became Chief of Staff in addition to Deputy Commanding General; Colonel Warren D. Hodges was named Deputy Chief of Staff, Support; and Colonel William H. Hubbard is now Deputy Chief of Staff, Test and Evaluation.

Project Blue Book UFO Studies Ended

Secretary of the Air Force Robert C. Seamans Jr. has terminated Project Blue Book, the Air Force program for the investigation of unidentified flying objects (UFOs). The decision to discontinue UFO investigation was based on:

- Evaluation of a University of Colorado report, "Scientific Study of Unidentified Flying Objects."
- Review of the University of Colorado report by the National Academy of Sciences.
- Past UFO studies.
- Air Force experience in investigating UFO reports during the past two decades.

The University of Colorado report, released in January 1969, concluded that little, if anything, has come from the study of UFOs in the past 21 years that has added to scientific knowledge, and that further extensive study of UFO sightings is not justified in the expectation that science will be advanced.

In an independent assessment of the scope, methodology and findings of the University of Colorado report, a panel of the National Academy of Sciences concurred with the university's recommendation. The panel further stated that, "on the basis of present knowledge, the least likely explanation of UFOs is the hypothesis of extraterrestrial visitations by intelligent beings."

Project Blue Book records will be retired to the U.S. Air Force Archives, Maxwell AFB, Ala. Requests for information will continue to be handled by the Office of Information, Office of the Secretary of the Air Force, Washington, D.C. 20330.

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